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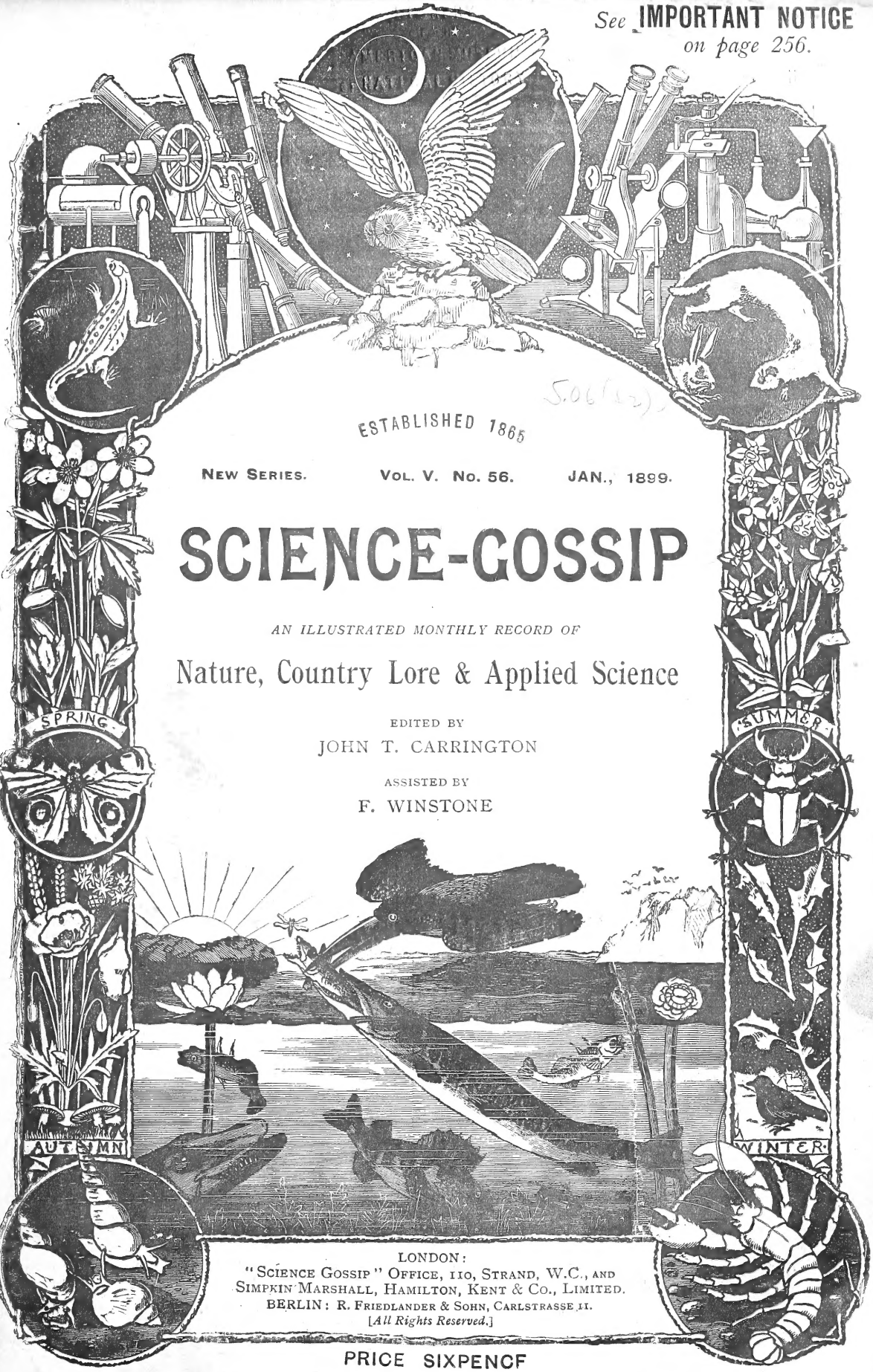

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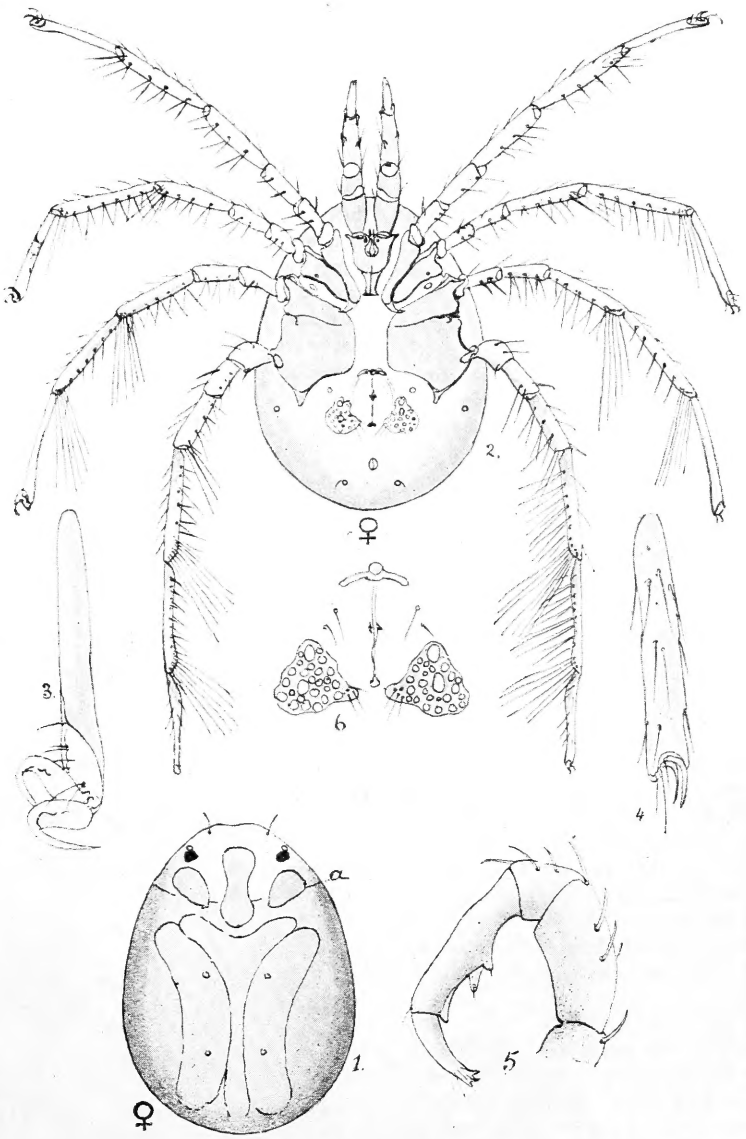
BRITISH FRESHWATER MITES.

By Charles D. Soar, F.R.M.S.

GENUS *CURVIPES* KOENIKE.

SOME years ago a series of articles was published in the pages of Science-Gossip (First Series, vol. xviii., pp. 193-249) on the different species of the genus *Arrenurus* then known to be British. As new forms have been found from time to time by Dr. George, of Kirton-in-Lindsey, Lincolnshire, supplementary papers have been published by the same author, until, as far as is known at present, all the British Arrenuri have been recorded and figured. The genus *Arrenurus*, however, contains a very large number of species, far more than any other genus of this



Curvipes nodatus *Müller.*

Fig. 1, female, dorsal surface; fig. 2, ventral surface; fig. 3, tarsi and claws of first pair of legs; fig. 4, tarsi and claws of fourth pair of legs; fig. 5, palpus inside surface of right-hand side; fig. 6, genital area of female.

family. The British Arrenuri at present known only number about twenty, so a great many more species will probably yet be found in this country as the water-mites are more extensively investigated.

The next genus in point of numbers to *Arrenurus* is that which forms the subject of this paper, namely, *Curvipes*. Of this genus there are about thirty known species. Sixteen of these are figured and described in Piersig's monograph of German water-mites, now being published. The British species number ten at the time of writing, nearly all of which are now recorded for the first time in these islands. Previous to Piersig's great work there was rather a formidable list of specific names under this genus; but that author has done excellent service by clearing a great number of them away. I only hope that Piersig has not suppressed too many. It is rather difficult to believe, on looking at the figures given by some writers of forms which Piersig now says are identical, that they can possibly be intended to represent the same species. Nevertheless, we cannot do better than abide by Piersig's ruling in the great majority of cases. His drawings are very beautiful and the details so well worked out that I do not think anyone can fail to recognize what he intends to represent.

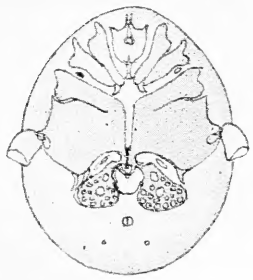


Fig. 7, *C. nodatus*.—Ventral surface of male.

Previous to 1891 the genus *Curvipes* had been known as *Nesaea*, a name introduced by Koch in 1842. In the first-mentioned year, however, Koenike pointed out that the word *Nesaea* had been appropriated by Lamarck in 1812 for a genus of Polypes; so he proposed the word *Curvipes* in the place of *Nesaea*, and this has been accepted by all the modern writers on water-mites.

The Genus *Curvipes*.

The characters of this genus are:—Body soft-skinned. All the legs supplied with swimming-hairs, and all terminated by claws; the tarsi and claws of the third pair of legs of the male are specially modified. On each side of the genital fissure are six or more so-called genital suckers or discs, either on special plates or simply let into the skin. Epimera form two distinct groups on each side. Palpi not chelate. Eyes wide apart. I will take as the type species of this genus *Curvipes nodatus* Müller. This is a large and beautiful mite. It contains in a marked degree all the characters common to this genus, and it is not uncommon.

I.—*Curvipes nodatus* Müller, 1781.

Female.—I first describe the female, because I think the females can be more readily recognised than the males; in *Arrenurus* it is the reverse.

The individuals of *Curvipes nodatus* vary much in size, so also does the size of the body in proportion to the other parts. The mite from which I have made my drawing (1) appears to be an average specimen, so I will give its measurements.

Body (fig. 1).—Oval or egg-shaped, the smaller end being placed anteriorly. Length, 2·20 mm., width about 1·60 mm. Colour: The front region about the eyes, from where I have drawn a curved line, is yellow (*a*, fig. 1); the body is red, rose-madder being the nearest colour for comparison; sometimes there is another trace of yellow on the posterior margin: the three patches on the front part are of a very dark brown; the two curved pieces are a much darker red than the other part of the body, and the T-shaped piece in the centre of the back is a very light red.

Eyes are exceedingly dark red, almost black.

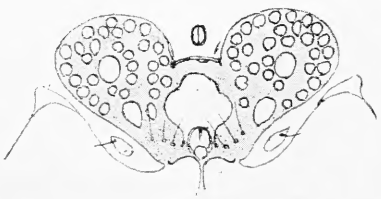


Fig. 8, *C. nodatus*.—Genital area.

Legs vary in length in different specimens in proportion to size of the body. In this particular mite the first leg was 2·76 mm. long from the epimera to the ungues. Each leg, counting backwards, gradually gets longer, until the fourth leg measures 3·24 mm. The swimming-hairs on the first leg are very few, but the fourth leg has a great number (see fig. 2). The first two joints of all the legs are generally a bright yellow; the other joints are blue; the two colours blending gradually. Sometimes the tarsi are also yellow. I have occasionally noticed purple in place of the blue in the legs.

Claws are not all alike on the four legs. The

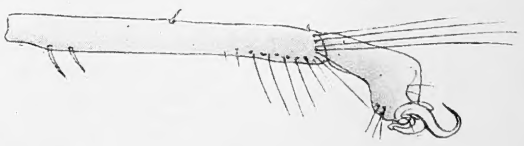


Fig. 9, *C. nodatus*.—Last two joints of third pair of legs.

first pair are represented in fig. 3, but the fourth pair are as in fig. 4.

Epimera are arranged in four groups (fig. 2),

(1) All the drawings illustrating this article are by Mr Charles D. Soar, and from original material.—[Ed. *S.-G.*]

two on each side of the ventral surface; in colour they are a deep red.

PALPI have five joints: the second is the thickest, the fourth the longest. They are like the legs in colour—first two joints yellow, others blue. Length about 1·08 mm.

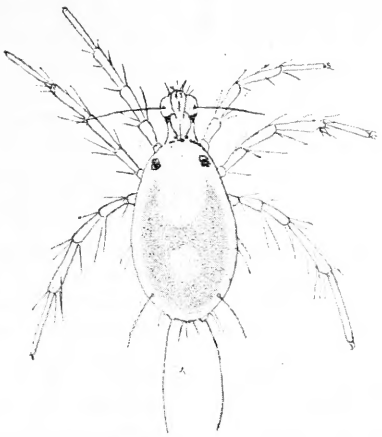


Fig. 11, *C. nodatus*—Larval stage.

GENITAL PLATES, two, one on each side of the fissure. The number of discs on each plate varies. In the mite under observation there are twenty-four on one side and twenty-seven on the other. They also vary in arrangement, but there always appears to be two discs on each plate larger than the others. In colour the ground part of the plate is pink, the discs yellow (see fig. 6, which is drawn from a specimen mounted in Canada-balsam). The genital plates have well-defined edges.

MALE.—The male is smaller than the female, being only 1·90 millimetres in length; but this is not the sole difference, for the epimera, instead of being quite wide apart and separated, as in the female (fig. 2), are quite close, and apparently joined together at the posterior end (see fig. 7). The plates on each side of the genital opening are different in shape to those of the female. In the centre is a large deep cavity (figs. 7 and 8). Very often in the summer one may take a male *Curvipes* with both the third pair of feet firmly fixed in this hollow (see fig. 22). There are the two larger suckers, or discs, in each plate, similar to those in the female; but the actual number and arrangement of these discs also varies. In one specimen I counted thirty-three on one plate and thirty-four on the other. In another specimen I found thirty-three and thirty-one respectively.

Fig. 10, *C. nodatus*.—Genual joint of fourth pair of legs.

The last two joints of the third pair of legs are given in fig. 9, which shows a very peculiar formation and how different are the third pair of the male feet compared with those of the female. On the fourth leg is another extraordinary joint, called the genual (fig. 10). This joint is peculiar to all the males of this genus; their object, I believe, is to hold the female at the time of pairing.

The COLOUR of the male is same as the female.

The LARVA of this mite is seen in fig. 11. It is about 0·56 mm. long. The figure was drawn from a living specimen sent to me by Dr. George in June, 1895. It differs in colour from the adult; its prevailing tint being a pale green. In this stage it is provided with six legs only.

LOCALITIES.—The drawing of the female (fig. 2) was made from a specimen sent to me by Dr. Measures, taken in Epping Forest, Essex, in June, 1895. Dr. George has also found this mite several times in Lincolnshire. I have found it not infrequently while collecting around London.

Koch gives a beautiful coloured drawing, both male and female, of this mite, under the name of *Nesaea coccinea*. Müller only gives a figure of a male of this species, showing the third pair of feet locked in the genital opening.

Dr. George says that during copulation the concavity of the fourth pair of legs fits on to the shoulders of the female, and the single claw of the third pair of feet are hooked into the female sexual organ.

(*To be continued.*)

YORKSHIRE NATURALISTS' UNION.

THE thirty-seventh annual report of this admirably managed society, which would be better entitled the Northern Counties Union, as it is so gradually extending its influence, was presented at the Scarborough meeting on December 17th. There are now thirty-seven societies affiliated, with 2,884 members. The annual income—£479—indicates the prosperity of the Union. During 1898 six field meetings, one in each division of the county, and a fungus foray were held. An advantage gained by the administration is that of reduced railway fares for members attending these meetings. The sectional work carried on by various committees of research has been successful. Among these sections we notice the Yorkshire Boulder Committee, Fossil Flora Committee, Geological Photographs Committee, Coast Erosion Committeee, Micro-zoology and Micro-botany Committee, Marine Biology Committee, Wild Birds and Eggs Protection Committee, Mycological Committee, Bryological Committee, and Coleoptera Committee.

LEPIDOPTERA IN SOUTH-EAST ESSEX.

By F. G. Whittle.

IN the following remarks upon the butterflies and moths of the south-eastern corner of the county of Essex, I shall refer more particularly to those species which I have myself captured in the neighbourhood of Southend-on-Sea, where, for some years past, I have studied and collected the lepidoptera in the comparatively limited time at my disposal.

The region, geologically speaking, rests on the London clay, with caps of gravel and sandy deposits in many localities. Thus, the soil varies considerably, for although the clay is immensely thick, the cappings are often of sufficient depth to lift the upper soils far beyond its influence. As an instance, it may be mentioned that the boring for the well adjoining Prittlewell Vicarage, showed over forty feet of surface soil, brickearth, gravel and sand, before reaching the clay, which is there 380 feet in thickness. The district being surrounded on two sides by sea-water, that is, on the east, north of Shoebury, by the German Ocean, and south by the estuary of the Thames, the marine influence is evident in the flora. From the meteorological aspect, South-East Essex is one of those parts of Britain where there is least rainfall, and an excess over the average of sunshine.

The particular district where most of my entomological work has been done during the past few years, extends from Canvey Island on the west, to Hadleigh and Hockley on the north-west, to Barling on the north-east, and Shoeburyness on the south-east. Surrounding Canvey Island, on the sides of the tidal creeks, are numerous salt marshes, locally called saltings; these form fine collecting-grounds for the lepidopterist, as there are several local species not to be found elsewhere in Britain so readily as there. The same remarks apply to the coast-line extending southwards from Barling to North Shoebury, whence sand-hills run round the point until they reach South Shoebury Church. This latter fine collecting-ground is now no longer accessible to the entomologist, for it is all occupied by the Government School of Gunnery. Magnificent guns are tried and extensive scientific artillery experiments are carried out where rarities such as *Deilephila euphorbiae* are said to have occurred in bygone times. *D. galii* probably occurs still, for the larvae of that species was found there, not uncommonly, only a few years ago by the late Mr. Cooper, of Wanstead, and seen the same autumn by my friend Mr. Carrington, the editor of this magazine.

The country inland is undulating, and rises to considerable elevation at Hockley and behind Eastwood to Rayleigh, also at Hadleigh, where the remains of the old castle form such an interesting landmark. Much of this inland portion, as also the reclaimed part of Canvey, is occupied by arable and grazing land; but there are very extensive woods at Hockley and Eastwood. In these woods it is said that the old collectors used to take *Apatura iris*, *Limenitis sibylla* and *Melitaea athalia*, but it has not been my fortune to rediscover any of them, though the food-plants of all are common there.

As already stated, my time for collecting insects is very restricted, and as yet I have by no means taken every species recorded by other workers in this region. For instance, I confidently hope to get in future seasons such butterflies as *Vanessa polychloros*, which Mr. Carrington tells me he has seen on several occasions by the old hedges north of Hadleigh Castle; *Pararge egeria*; *Thecla w-album*, that occurs a little east of my district, and will probably be found within it, in the Benfleet neighbourhood; *Lycaena argiolus*, which the Rev. H. G. Lang, M.D., takes in his garden at All Saints' Vicarage, Southend (it is also said to occur in the Shrubbery and on other parts of the cliffs of this town); and *Nemiobius lucina*, when I can give more attention to the woodlands. The fact is, my time has been hitherto devoted to improving my acquaintance with the extremely local saltmarsh and other interesting sea-shore loving Lepidoptera; not the least of them having been *Bombyx castrensis*, *Geometra* (*Phorodesma*) *smaragdaria*, and the very rare *Epichnopteryx reticella*.

As a list for reference to the work of others in the Southend district one cannot refer to anything better than the late Howard Vaughan's compilation of the Lepidoptera, taken by himself, or recorded, up to the time of its publication. It was issued in 1889, in the third volume of "The Essex Naturalist"; but copies of the paper are occasionally separately offered by London booksellers. In fact I was quite unaware of the existence of this publication until I saw it, two or three years ago, in a catalogue. Mr. Edward Fitch, F.L.S., has a note in an early volume of "The Essex Naturalist" on the work of the late Mr. Christopher Parsons in South Essex. Part of his natural history collections are now deposited at the Southend Institute. In Mr. Fitch's note there is a reference to the capture, in 1826, on July 31st, of several specimens of *Papilio machaon* on the coast near Southchurch, where Parsons resided. This note is particularly interesting, as fixing a date when the swallow-tail butterfly still inhabited Essex.

I will commence my papers with the butterflies of South-Eastern Essex.

RHOPALOCERA.

Pieris brassicae and *P. rapae* are common throughout the district; *P. napi* is not so abundant. Mr. Carrington tells me he saw, in 1877, a specimen of *P. daplidice* that had just been taken by a boy in the meadow next Leigh, between the railway and the sea.

Euchloë cardamines, generally common. It was abundant during the past (1898) season. Several females were observed resting on cruciferous plants growing by the sides of roads near Hadleigh village.

Colias edusa, occasionally. Occurred in considerable numbers in 1892; several seen on the saltings at flowers of *Aster tripoleum*. *C. hyale* was taken by Mr. Carrington's assistant, the late Edward Matthews, commonly one season about 1876, in clover-fields between Southend and Shoebury.

Gonopteryx rhamni, not uncommon at Eastwood; hibernated males were very common last April.

Argynnis selene and *A. euphrosyne*, common near Eastwood, in wood clearings and fields bordering the woods. *A. adippe*, not uncommon at Eastwood.

Vanessa urticae, common. *V. io* not often seen. I found a large brood of larvae in July, 1890, on the cliff at Southend. *V. atalanta*, a few specimens seen nearly every season. *V. cardui* is here, as elsewhere, a most uncertain insect; in 1892 and 1894 larvae were common on thistles between Leigh and Benfleet.

Melanargia galatea, well distributed; taken on the river wall between Leigh and Benfleet; in one field only at Canvey; freely in a field near Hadleigh village, and in the rough fields between Leigh and the Castle.

Pararge megaera, common.

Epinephele ianira and *E. tithonus*, both common. I have often found larvae of the former at Benfleet when collecting larvae of *Leucania impura*. *Epinephele hyperanthes* occurs at Eastwood and Hockley.

Coenonympha pamphilus, abundant. Some examples I have taken are unusually large.

Thecla rubi, far from common. Once seen on some blackthorn growing on the river wall. Only one or two specimens observed at Eastwood.

Polyommatus phloeas, abundant. Some of the Canvey specimens are very large.

Lycaena astrarche, common. Abundant near the river wall on the southern side of Canvey. *L. icarus*, common everywhere. *L. argiolus* occurs at Southend-on-Sea, but I have not happened to take it.

Syrichthus malvae, common at Eastwood; also near the railway bank between Benfleet and Pitsea.

Nisoniades tages. Eastwood, but not common,

Hesperia thaumas and *H. lineola*. The former not uncommon, the latter abundant and extending its range; for when it was first differentiated as a British species, by Mr. Hawes, and its life-history made known, it was thought that while *H. thaumas* was to be looked for on the higher ground, *H. lineola* could not be taken freely away from the marshes. I noticed last season, in a field skirting a wood near Hadleigh, where there were one or two fine clumps of *Lotus corniculatus*, that *Hesperia lineola* was better represented than *H. thaumas*. I have found the larva of *H. lineola* at Canvey, and bred the butterfly. *H. sylvanus* is common.

(To be continued.)

HELIX NEMORALIS IN IRELAND.

I HAVE received through Mr. R. Welch, of Belfast, particulars and some specimens of *Tachea nemoralis* gathered on the island of Valentia and the adjoining islet of Beginnish. Both collections were made by Miss Delap, the former chiefly in the Rectory garden. I have details of 121 specimens from Valentia. Of these 65 are of the var. *libellula*, 44 *rubella*, and 12 *aurantia*. The band formulas are as follow:— Bandless, 00000 = 23 specimens; 1 band, 00300 = 46; 5 bands, 12345 = 27; 5 bands in 1, (12345) = 2; 5 bands in 2, (1234)5 = 2; (123)(45) = 4; 5 bands in 3, 1(234)5 = 1; (123)45 = 5; 5 bands in 4, 1(23)45 = 10; 1(23) × 45 = 1.

The var. *albolabiata* occurred in twelve instances in the yellow, or var. *libellula*, form, and one with the red or *rubella* ground-colour. The same white-lipped variety was most frequent in the band formula 00300, but also occurred once in (123)45. There were a few strongly marked var. *undulata*, chiefly with yellow ground-colour.

My attention has been drawn to a whitish stripe below the third dark band, especially where the centre one only is present; this occurs somewhat frequently in Kerry specimens generally. Those examples I have seen, however, do not appear to be very unusual, this lighter band being as often found in the South of England.

Many of the Valentia shells of *T. nemoralis* are very thin and delicate. The colours are fairly bright, but not more so than from some other localities. In size they are about the average of typical specimens found in Britain.

From Beginnish Island I have particulars of 67 specimens, divided into 43 *libellula*, 23 *rubella*, and 1 *aurantia*. The band formulas are as follow:— Bandless, 00000 = 35 specimens; 1 band, 00300 = 6; 2 bands, 00305 = 1; 3 bands, 00345 = 1; 4 bands, 02345 = 2; 10345 = 3; 5 bands, 12345 = 9; 5 bands in 1 (12345) = 1; 5 bands in 2 (12)(345) = 4; 5 bands in 3 (12)3(45) = 3; (123)45 = 1; 5 bands in 4 (12)345 = 1.

The specimens from Beginnish Isle are only about two-thirds the size of those from Valentia, but are thicker and stronger; very weatherworn.

J. T. CARRINGTON.

SOME NEW PHYSICAL APPARATUS.

By James Quick.

(*Continued from page* 198.)

A Gold-leaf Electroscope, with Special Ebonite Insulation.

MUCH inconvenience and annoyance is very frequently caused to a lecturer when, having prepared an elaborate set of experiments on static electricity, he finds that, due to dampness or other causes, his gold-leaf electroscope at the last moment becomes quite unreliable, and will not hold its charge for more than about half-a-minute, with the result that his lecture is a partial failure from an experimental point of view. Electroscope experiments illustrating Faraday's laws of equal inductive charges demand that the electroscope shall not lose any of its charge during the whole time of the experiment, while it is found quite impossible to make quantitative measurements upon relative specific inductive capacities if one has an untrustworthy instrument. The present pattern, made to Professor Chattock's design, is intended to overcome these troubles and also to be a useful instrument for direct lantern projection on the screen. Its efficiency depends principally upon the insulation afforded by a special ebonite arrangement for supporting the gold leaves.

The construction of the instrument is seen from fig. 3, and fig. 4 shows a sectional view

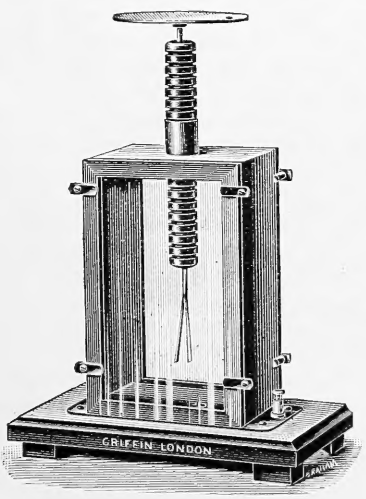


Fig. 3.—Gold-leaf Electroscope.

of the ebonite insulating part to which I have just referred. A rectangular arch of zinc is screwed to a wooden base, and is provided with two parallel glass sides held in position by small removable brass lugs. The electroscope is thus adapted for projection, as it can be placed directly in front of the condenser of a lantern, and the image of the gold leaves focussed upon the screen by means of an ordinary objective. Down through the centre of the top of the arch slides an ebonite rod (E E) supporting the gold leaves, etc. This ebonite rod is drilled from both ends to about half-an-inch at the centre (A B), and a smaller hole (C) is drilled through the centre-piece. This smaller hole carries the brass rod (D) supporting the leaves, which are thus only in contact with half-an-inch of ebonite on the inside of the rod. The only source of leakage, therefore, is up the brass rod to the centre of the ebonite rod, and either through the substance of this or along its inner surface to the outside, and over this to the metal arch supporting it. The result is that the charge is very constant upon the leaves, and can be retained there for days. The sensitiveness is increased by making the gold leaves thin and narrow, and by keeping the electrical capacity of the instrument small. A binding-screw is fixed to the supporting arch for properly earthing it, and a small hole drilled in the top brass plate for hitching on wires from the various instruments under experiment.

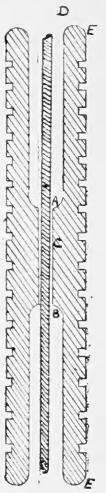


Fig. 4. Section of Ebonite Insulation.

An Adjustable Cathode X-Ray Tube, Magnetically Controlled.

When working with the ordinary form of X-ray tube, two difficulties present themselves. Firstly: under different conditions of working and different spark lengths, the one tube with its one degree of exhaustion and one value of resistance cannot be adapted. Secondly: upon continued working, it is found that the exhaustion, and therefore the penetrating value, of the tube increases, so that finally, in spite of repeated heatings by a Bunsen flame or other source, to increase the pressure inside, the resistance of the tube becomes so high that the electrical discharge will not take place under the same conditions for which the tube was originally selected.

These difficulties have been overcome, chiefly owing to the persistent patient work of Mr. A. A. C. Swinton, whose results upon the *modus operandi* in the interior of the tube, also upon the conditions

affecting the emission of X-rays, have proved of very great importance in the work. Among other things Mr. Swinton found, with experimental tubes made in his laboratory, that if the anode of the tube be so arranged that the distance between it and the cathode could be adjusted, then a ready and very simple means was at hand whereby the resistance and penetration could be altered to suit the varied conditions imposed. The nearer the anode is placed to the cathode the higher the resistance, and consequently the higher the penetration of the tube, and *vice versâ*. In moving the anode of a tube, however, the point of origin of the X-rays is also moved for each adjustment, which is certainly a disadvantage, especially when a difficult radiograph, requiring a lengthy exposure, is being taken. While, therefore, taking advantage of Mr. Swinton's very useful principle of varying the distance between anode and cathode, Dr. Dawson Turner, in conjunction with the writer, reversed the arrangement by making the cathode movable and keeping the anode fixed. We added a further modification in that the cathode is adjusted by magnetic means, so that movement may easily be made without disturbing the tube at all while it is in any desired position.

This tube, as is shown in fig. 5, is so constructed that the cathode in its movement slides in and out of the side annex blown in the bulb, and is kept in proximity to the glass throughout its movement; for it has been found that the latter has a greater influence upon the resistance of the tube than mere movement to and fro when the cathode is quite out into the bulb space, and it affects it in the reverse way: that is, the nearer the cathode is to the anode the lower the resistance, and this increases again as the cathode is gradually drawn back inside the annex. Fig. 5 shows an earlier pattern of this tube, in which the cathode moves out into the centre of the bulb space. The present form, however, is arranged so that its action depends upon this proximity of the cathode to the glass. The above

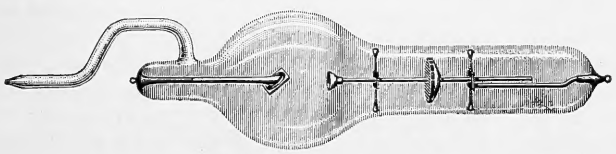


Fig. 5.—Adjustable Cathode X-rays Tube.

modifications for varying the penetration of a tube are an advance over the older uncertain methods of potash tubes, etc.

Portable Limelight Apparatus Independent of Coal-Gas or Compressed Oxygen.

This apparatus, as shown in fig. 6, should prove a useful one for lantern operators, lecturers, and others, when working under conditions unfavourable to the supply of either coal-gas or oxygen. The carrying of gas-bags or cylinders from place to place is always a trouble and expense, sometimes resulting in the oxyhydrogen

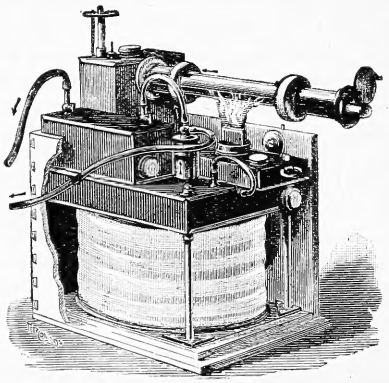


Fig. 6.—Portable Limelight Apparatus.

light being substituted by the comparatively unsatisfactory oil-lantern. By means of the present self-contained apparatus, the two necessary gases can be generated rapidly, easily, and safely within five minutes after starting. In virtue, also of its portability and ease of working, it is not only adapted to the above conditions, but likewise commends itself for general use.

The construction of the apparatus is seen from fig. 6, which figure, however, does not include a few small but important modifications recently made. The oxygen is generated by the decomposition of small cylinders or cartridges, which are essentially composed of potassium chlorate and black oxide of manganese. These cartridges are fed at intervals through a horizontal metal retort, heated by a spirit-lamp placed underneath. The spent cartridges, as they are pushed through, pass into a suitable receiver. The gas generated as above explained, passes through this cartridge-receiver into the lower bellows, and is controlled by a stopcock with a spring lever, by means of which the gas can be shut in. By pressing down the lever the oxygen is forced through a valve into the upper or pressure bellows. It is now between two boards and subjected to a constant pressure from a spring arrangement controlled by a fusee, which pressure can, moreover, be varied by altering the strength of the spring, a ratchet-wheel and pin being provided for the purpose. From the pressure-bellows the oxygen passes through a stopcock, part direct to the jet to be burnt as oxygen, and part to a saturator which is supplied with gasoline. From this

it emerges as a combustible mixture of carburetted oxygen and, as such, flows on to the jet.

From the fact that the gas is generated very steadily and not under pressure, the apparatus should compete with cylinders, both on the score of economy and safety. No difficulty at all is experienced in timing the intervals at which to replenish the cartridges in the retort, nor does their insertion disturb the apparatus in the least degree. On the average about eight or nine cartridges are needed per hour when a continuous light is being used. The whole system shuts up in a box measuring 23 × 15 × 7 inches outside, and the total weight is under thirty pounds, this weight including two pounds of cartridges in box. Furthermore, the box is so arranged that the top can be used as a lantern-stand, the bellows working inside.

Suffolk House,
Dartmouth Park Hill, N.W.

A CORAL GALLERY FOR HASTINGS.

OF the various institutions which have from time to time been started, alike for the amusement and instruction of the public, very few can vie with the one lately added to Hastings. It is one of those exhibitions which both command the admiration of the mere seeker after the curious, and furnishes food for the really earnest student of nature in some of her most remarkable by-ways. Few, even amongst the ranks of biologists, realize how difficult it is to get detailed trustworthy information upon the corals and their allies. It is by no means an uncommon thing to hear them placed in the wrong sub-kingdom by people who really ought to know better. In this beautiful gallery, recently opened by Mr. John Morgan, may be seen the stony houses of the coral polypes, the external appearance of which, alas, too often constitutes our only knowledge of the subject. There are also there the polypes themselves, preserved in spirits, and such living illustrative specimens as can be kept in sea-water in aquaria. When one remembers that even in our national collection only some nine or ten genera of Madrepores are as yet named, while the group Alcyonaria are practically untouched, the value of a collection of this description, all named, described, and illustrated, becomes obvious. No expense appears to have been spared by Mr. Morgan in casing the gallery for the suitable display of the beautiful specimens he has been getting together for many years. In labelling each specimen, the chief pecularity is detailed and enlarged upon, no matter whether it be one of structure in the polype, or in its lavishly decorated house, or in its possession of a messmate. In the first case specially constructed lenses are arranged so that the otherwise unnoticed details become apparent; and in the latter, spirit-preserved specimens, or enlarged drawings of the various creatures, are displayed, and their functions described. The greater part of the problems of the life and origin of the creatures which we usually lump together as corals, are very fully dealt with. Thus a few hours spent in this gallery would place a student in possession of more facts than he could acquire by years of mere reading. It has been the experience of many students to acquire what they considered a tangible idea of the various structures of corals, but when referring to two or three other books they have ended in confusion, which has led to the abandonment of the subject. It is such backsliders as these that this gallery is able to win back by illustrating the somewhat numerous phenomena and structures. One dare not trust oneself to commence descriptive notes of the specimens, as many even excel those in the British Museum.

A large quantity of the treasures were originally in the Goddefroy Museum, Hamburg, and others have been collected by well-known scientific men who have made corals their special study, and include numerous rarities both for the morphologist and the mere admirer of elegance and beauty. There is one feature which ought to be of special interest, and that is, that every Wednesday afternoon a lantern demonstration is given, which ought to popularize this fascinating subject. In addition, there is always a curator in charge to conduct parties round the gallery, or give the information required by the individual student.

W. J. LEWIS ABBOTT, F.G.S.

St. Leonards; 21st November, 1898.

PURE VACCINE.

IT is stated that Mr. Stanley Kent, who is attached to the Medical Department of St. Thomas's Hospital, in London, has succeeded in isolating the microbe of vaccine. Mr. Kent has been studying and experimenting with this organism for the past five years with considerable success. By making a pure artificial culture he has produced vaccine independently of all the surroundings that have latterly raised so much public discussion. This being the case, much of the objection that has been raised by those who have claimed the exemption granted by the recent Act will disappear. A pure cultivation of the vaccine microbe cannot be open to the same objection as that obtained from other persons; for the germs of diseases must necessarily be absent. The culture has been used for the purpose of inoculation with the greatest success.

IMPORTANT NOTICE.

SCIENCE-GOSSIP.

CHANGE OF ADDRESS TO 110, STRAND, LONDON, W.C.

WE have pleasure in informing the readers, subscribers and advertisers in "Science-Gossip" that the proprietor of this Magazine has taken an independent office at 110, Strand, London, W.C., at which editorial and business arrangements will in future be carried on. This places "Science-Gossip" in the unique position of being the only scientific magazine having its own premises.

Would you kindly enter this change in your address-book.

In consequence of the introduction of further capital, and the independent position of the magazine, the readers will in future find considerable improvement and additions in the literary matter. Those departments which in the past have been especially attractive will be further developed. "Science-Gossip" will continue to be the organ of the field-naturalist as hitherto, but full space will be given, as has latterly been the case, to the modern aspects of biology.

More attention will be paid to the physical side of science, including monthly notes, and a series of articles upon new and useful physical apparatus, which have been kindly promised by Mr. James Quick, whose professional position renders him a specialist on the subject.

Under these circumstances we appeal to our present large circle of readers and supporters to assist in this improvement and development of "Science-Gossip," by extending the circulation through new subscribers, or even by mentioning the magazine to friends and acquaintances who do not already take it.

As "Science-Gossip" has now an independent office, the Editor will be glad to make the personal acquaintance of his contributors and subscribers, and will for that purpose set aside the afternoon on Thursdays, from 4 to 6 p.m., at this address, when he will be pleased to see any, especially contributors and readers from the country, who may happen to be in London.

The Editor begs to again remind the readers how valuable to others are short notes upon apparently trivial subjects, for what are familiar matters to the writer are frequently valuable though little-known facts.

The Editor will in future, as during the past two years, have the co-operation in the editorial department of Miss F. Winstone as assistant editor.

110, Strand, London, W.C.

CONTENTS.

RAINBOW WONDERS OF WINDERMERE.

AN article under the above heading appeared in the London "Daily Telegraph" of 12th October last. A friend of mine witnessed the phenomenon on the same day as the writer of the article, viz., Wednesday, October 5th, and was unable to account for it. He thinks the area of iridescence was too extensive to have been caused by trade refuse, and there was no steamer on the lake at the time.

The following is an extract from the article referred to:—

"There was no ripple on the mere, and when we pushed out into middle lake so marvellous were the reflections of fell and wood, so transparent the depths, that one could hardly tell whether we were upon water or suspended in middle air. Suddenly my companion cried, 'Look at the rainbows!' Gazing south towards Belle Isle, one saw the whole water iris-hued, as if all the rainbows that had ever sprung from earth to heaven had melted into the bosom of the lake and filled the sunny depth with liquid iridescence.

"Slowly we rowed towards them, and the rainbows stayed for us till our boat pushed into the lucent flood, and then as we moved forward, on either side our wake, the rainbows curved and quivered and sprang like horns of multi-coloured light to right and left, and lengthening out, shone far astern. On we went, wondering at the glory and the glow. Our boat's motion seemed momentarily to kill the marvellous prismatic flood, but it was only for a moment that the rainbows faded, and again, beyond the ripple and the washing of our oars, there sprang into being new rainbow-tinctured beauty of liquid purple, shot with green and orange and rose, and behind us as well as before us the lake mirror lay, one mighty opal, one flood of lucent pearl and fire.

"Beyond the rainbow lustres far away the lake seemed to have been silvered over with frost. One could have staked one's life, unless one's eyes were playing false, that the ice-king had been at work, and the thin ice-mirrors he had made were powdered with the hoary rime. But as one neared it the phantom ice-floe faded, and nothing but liquid rainbows for the keel to cleave and fashion again to wondrous loveliness, and the finest dust-like floating meal, remained, where before we might have supposed was a fair field for the skater's joy and curler's game. It was rainbows, rainbows all the way; and what was the cause of this October glory of rainbow flood? It was nothing in the world but a smooth lake surface, and the fine dust of pollen of the American water-weed *Vallisneria*. Others aver it is the gold dust of the water lobelia, which, floating upward through the tranquil water on a calm October day, lies on the surface of the polished lake mirror with power to change the face of the water into such a refracting and diffracting medium as to splinter all the sun into iridescence, and unravel the beam of white light into the colours of the prism.

"It would seem that the water must be of a certain temperature to encourage the plant to send forth its prism-makers to the surface. It is certain that no breath in heaven must stir if the lake-mirror is to work its magic charm. Only on rare days, such as was October 5th, could Windermere be clad in rainbow hue. One may live by the shore of the lake for another fifteen years before one may be fortunate enough to witness again the glorious phenomenon, or be privileged to push one's shallop through a league of liquid iris, or sail through miles of rainbow."

Now the scientific explanation as above given is open to the following objections. *Vallisneria*, which is not the American water-weed, does not grow in English lakes. *Elodea canadensis* (the American water-weed) does not yield pollen in England, only the female plant having been introduced into this country. *Lobelia dortmanna* (water lobelia) does not probably grow in sufficient quantities, and blooms earlier in the season. As, however, the description of "finest dust-like floating meal" seems to accord with the idea of pollen rather than with that of tar-oil, which has also been suggested to me, I should be glad if you, or one of your scientific correspondents, would express an opinion as to the length of time that the pollen of the water lobelia, or other water plant, say *Potamogeton*, would remain after pollination on the surface of the lake, and whether the iridescence could be attributable so late in the season to such a cause.

If not, is there any seed of plant, or spore of fern or moss, or freshwater alga, which would produce the effect described? In the "Natural History of Plants" (Kerner and Oliver, vol. ii. p. 621) there occurs under the head Cyanophyceae, sub-head Nostocaceae, the following passage:—"Very little is really known about the life-histories of these interesting plants, which so frequently appear in great quantities on or near the surface of the water and then as mysteriously disappear."

M. J. TEESDALE.

St. Margaret's, Thurlow Park Road, West Dulwich, S.E.

[This rare phenomenon was observed on the surface of Lake Windermere in 1851, also about 1874, likewise on Derwentwater in the same year, and on Loch Lomond in 1853. See SCIENCE-GOSSIP N.S., vol. i. pp. 90 and 165.—ED. *S.-G.*]

VERNACULAR NAMES.—The editors of the "Naturalist" are collecting vernacular names used in the Northern counties for animals common in these districts. We do not observe many which are new to us, though some are unfamiliar, such as "twitch-bells," or "furking robins," local names in East Yorkshire for earwigs. In the same district "tommy tailors" is used for daddylong-legs, and "artystraws" for shrews. "Foumart," as applied to a stoat, must, we think, be an error, as it is the usual name in the North for the marten, which was by no means uncommon half a century ago in Lancashire and Yorkshire, where the expression "stinks like a foumart" is still frequently used.

INSTINCT.

By R. Dickson-Bryson, B.A., F.P.S., F.R.As.S.

(Continued from page 207.)

Carnivorous Plants.

MANY people, although little interested in the details of attainable science, are curious enough to pry into the recesses of the obscure, where certain knowledge is impossible. This is the region of conjecture and dispute. Still, between the known and the unknown there is a line of demarcation on the frontiers of which we may safely indulge our incursive curiosity; to pass that boundary is forbidden, and at present impossible. We must have a care, therefore, not to be dogmatic, and ever keep in mind that here we are in the fairyland of speculation, engaged in a pursuit perhaps not wholly without charm, and certainly not altogether lacking utility. This pursuit is of intense interest when the object is to trace out the unity of nature, and that in a pre-eminent sense when the unity is that between the plant and animal kingdoms.

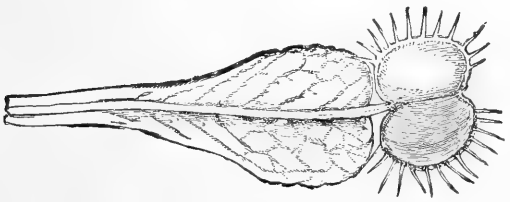
Most of us have very hazy notions of what plants and animals really are; and few, perhaps, would be willing to concede that the difference is not absolute, but merely one of degree. To define the limits, however, and say where the one ends and the other begins, has always been a difficulty, and even now is a conundrum in biology. Probably a satisfactory definition will never be found, since the tendency of all modern scientific results is to obliberate all such strongly marked distinctions and systems of classification.

Organisms exist which at one period of their life-history are plants, and at another animals, while the microscope has revealed others which combine in their minute structures plant and animal properties. Of these may be instanced the *Epistylis grandis*, *Charchesium polypnium* and the interesting *Zoothamnium arbuscula*. Plant-animal may sound a little paradoxical, but the proverbial fact is sometimes stranger than fiction; a remark that is true in the case of these tiny creatures. They bridge the chasm between the two kingdoms. In the *Epistylis grandis*, the trunk and branches are perfectly rigid, while the bell-like flowers are all active with the phenomena of animal life. The *Epistylis* is aquatic, and delights in still pools. It procures its food by setting up a whirling motion in the water with its fringes, thus diverting floating material into the vortex, where it is seized. Each flower is an independent individual, and selects its own food. In due time the flower leaves the parent stem, and settles down to found a family of its own. It first develops a stalk, and fixes it to a steady object, then its activity ceases—it appears to sleep. During this period it contracts. This process continues until it has produced its double, a companion soon to be its equal, that will assist in founding a colony similar to the one from which they both migrated. In the composition of these organisms it may be admitted that there is more of the animal than the plant.

A broad distinction between the two kingdoms, and one sufficient for all practical purposes, may be found in the nature of their food. The plant, as a rule, derives its food from simple substances, such as CO_2, NH_3 and H_2O, and has alone the power of forming the material of animal structure, viz., proteine. This the animal cannot make itself, and it becomes one of the cardinal distinctions between the two kingdoms. The animal, on the other hand, must have its food previously prepared and elaborated. A more accurate distinction is that plants convert actual energy into potential energy, while the animal reverses the process, and converts the potential into active energy. Old-fashioned distinctions, it is clear, must be abandoned. The animal merges into the plant and the plant into the animal, and each shares the properties of the other. We cannot longer regard them as absolutely distinct. The evolution hypothesis implies a bifurcation in the original process of germ development, and previous to that primeval division the germ cells were similar in all respects. This is probably the correct theory. Evidence of its truth may be found in the nature of the carnivorous plants. These remarkable plants lie on the frontiers of the two kingdoms. They are flesh-eating, or, more properly, flesh-absorbing plants. There is neither mastication nor deglutition, yet the digestive process is as complete as in that of the animal. Those who have observed that phenomenon and the operations leading up thereto, cannot have failed to note the marked evidences of instinct. The pitcher-plants (*Nepenthes*), sun-dews (*Drosera*), and Venus fly-traps (*Dionaea*) act as snares, retaining insects which alight on them. It has been conclusively shown that these insects contribute to the nutrition of the plant; but what chiefly concerns us and our purpose are those curious movements of the leaf analogous to acts of prehension in animals.

The pitcher-plants (*Nepenthes*) of the East Indies have their leaves terminated in a pitcher-like glandular structure which secretes a digestive

sub-acid fluid. These peculiar developments are fly-traps. The lip of the cup all round secretes a honey-like fluid which attracts flies, and hither these guileless creatures come in vast numbers; but scarcely have they commenced to enjoy the *ambrosia*, than they slip into the cup and are drowned. This is an instance of deception in the plant world of consummate cunning and ingenuity. Experiment confirms the digestive property of the liquid, and any one in possession of one of these plants may perform the experiment for his own satisfaction. It is simple and interesting and worthy the labour. Immerse a small piece of the white of a hard-boiled egg in the fluid, and in about fifteen minutes the edges will have a ruptured and gnawed-like appearance, while the surface will be found converted into gelatine. Vary the experiment by substituting a small piece of raw flesh, and the whole will gradually dissolve. A piece of cartilage is soon transformed into gelatine.



Leaf of Venus Fly-trap.

The only legitimate inference from these experiments is, that there are several groups of plants deriving a part of their nourishment from the animal kingdom.

The *Dionaea*, or Venus fly-traps, seize insects which alight on their leaves. The extremity of the leaf is divided into two parts, and round the edges of these divisions is developed a ray of very sensitive tentacles, while upon the upper surface of the leaf, on each division, are three others—long and sharp, and of extreme irritability. A hinge unites the two sections, enabling them to fold together and form a miniature prison; and woe to the incautious insect that touches them! his doom is at once sealed. It is seized and suffocated between the two parts of the leaf. The leaf when touched closes instantly, and the poor insect vainly struggles for freedom. It is retained until its fluid parts are completely exhausted, and then the lobes of the leaf open and resume their normal positions. The little victim may be spared the agony of a cruel and prolonged death, if the observer be humane enough to forcibly open the lobes and set him free. The captive is not killed and crushed at once. Its dissolution is gradual, and the exquisite refinement of its torture surpasses the ingenuity of the Inquisition. We may, in passing, note the exceedingly amusing antics of a spider after his delivery. For a moment he appears bewildered, then he surveys his surroundings and promptly takes his departure with the utmost celerity; on no account can he be induced to return, not even for the most tempting of struggling flies introduced into his neighbourhood.

The *Dionaea* consumes the insect. After his capture the glands secrete a viscid liquid which has the property of dissolving living animal tissues. This liquid closely resembles that of the peptic glands of animals, and is only efficient when associated with an acid. The solution is, therefore, a true digestive process, resembling in every particular the corresponding process in the intestinal canal of animals. The insect serves as food for the plant.

In Scotland we have three species of *Drosera* or sundews, a genus of fly-trap allied to the *Dionaea*. The surfaces of their leaves are frequently veritable fly cemeteries. Insects may be found on them in all stages of decomposition. The upper part of the leaf, and particularly round the edge, is furnished with long, reddish hairs, from the extremities of which exudes a tiny drop of a sticky liquid. This liquid is neutral at first, but becomes acid on the application of a nitrogenous substance. These irritable feelers, for such they are in effect, are responsive to the merest touch of a foreign body; and the insect that commits the mistake of alighting on them is instantly seized and glued down. All the tentacles bend inwards and carry their prey to the centre of the leaf, where, when digested, it is absorbed. Here is a double trap, the tentacles and the glue; a more dangerous and cunningly-devised apparatus for the destruction of the poor fly than even the spider's web.

I cannot omit mention of *Pinguicula vulgaris*, or

Butterwort.

common butterwort, so called from being used by old-fashioned people to curdle milk. The butterworts are a group of plants belonging to the

same family as the bladderworts, and have their leaves sticky with a fluid exuded from the numerous hairs scattered over the surfaces The leaves roll up their edges over captured insects, and gradually digest them.

In *Utricularia*, or bladderworts, several species of which occur submerged in our pools and rivers, water-fleas and other insects are suffocated in the bladders into which they appear to go for security from other enemies. These bladders have the property of absorbing and dissolving animal matter.

To a casual observer these carnivorous plants would appear to thrive as well without as with nitrogenous food; but, to settle that point, Professor Francis Darwin fed a number of *Drosera* on roast meat. Every four or five days they received a new ration, and at the end of two months they were found incomparably superior to the others that were shut up in such a way as to exclude insects. The stems and branches of the former were stronger and more vigorous, while the leaves were greater in number and of a brighter green, the flowers were more abundant and of livelier colours. The plants were compared even to the seeds. Appended are the results of Professor Darwin's experiments :—

Bladderwort.

Experiments on Drosera.

	Unfed.	Fed.
Total weight of plants, excluding flower-stems	100	122
Total number of flower-stems	100	165
Sum of heights of flower-stems	100	160
Total weight of flower-stems	100	232
Total number of capsules	100	194
Average number of seeds per capsule	100	123
Total weight of seeds	100	242
Total number of seeds	100	380

These results show the benefit derived by the fed plants, especially in the formation of seeds. It is to be inferred from these experiments that plants and animals have more points in common than many are disposed to concede. We see that nature, though sparing of causes, is prodigious in effects, and shows a great variety of phenomena having a common and unique origin. We further learn that in the economy of the plant and animal many of their functions are analogous.

To our accustomed conception of a plant it appears incredible that the *Algae*, a low form of plant life, should develop animated seeds, seeds having the capacity of locomotion; but one need only observe their nimble movements in water to be convinced of its truth. In the apparent enjoyment of their youth they swim and gambol about in all directions; but as they grow older these gambols cease, and they settle down to the earnest realities of life. They terminate their youthful career by fixing themselves to some support and there giving birth to a new plant. Their motive phenomena are due to numerous appendages developed on the surface of the seed, and which propel them through the water.

The sponge, a low form of animal life, also develops locomotive seeds. The locomotion of these germs is due to delicate cilia attached to the posterior part of the cell. This germ is an independent atom of living matter, and moves through the water as if propelled by a will prescient of its future destiny. It at length fixes itself to some stationary object, and develops into a sponge.

On the boundary line between the two kingdoms nature appears to delight in confusing the inhabitants. It accords locomotive powers to plants in the spermatic stage, while the animal seeds similarly endowed give birth to immobile animals. These elementary beings have identical modes of reproduction—both divide to multiply.

With so many harmonies we infer that instinct is equally distributed. If locomotion is possible without a nervous system, it is involuntary and therefore instinctive. The cause of the motion is within the seeds, and their subjection to that cause is absolute. The motions of the seeds of *Algae* and sponges are instinctive, and they fix themselves instinctively to develop new creatures.

We would seek in vain for essential differences between the two great divisions of animated nature. There is none. We constantly meet with analogies among their phenomena. Plants, it is true, have no mind nor will; their acts are purely mechanical and necessary. Every plant has a special instinct that determines its individualism. The *Valisneria*, the *Ranunculus*, the *Drosera*, and a hundred others, have their special instincts, and nothing can disturb their rigorous uniformity. Some are more ingenious, some more cunning, and some are more deceptive in their habits.

Among animals instinct is more marked than among plants, but it is the same instinct. The complexity of animal instinctive phenomena is due to individual and organic peculiarities. The same steam controls a whole factory and executes

a variety of works. So there is a unity of instinct and a variety of adaptations, or a unity of cause and a variety of effects.

To the instinctive acts of animals we may add those of intelligence, habit and aptitude; and we must clearly discern between them to avoid confusion. These faculties differ in their nature and origin. We must distinguish between that which is acquired, as habit, from that which is innate, as instinct; that which is perfect and immutable, as instinct, from that which is susceptible of development and improvement, as aptitude; finally that which is free and deliberate, as intelligence, from that which is purely mechanical, as instinct.

Instinct is never in unison with the rank the animal holds in the animal hierarchy. The most highly developed instincts are not found among the higher but among the lower animals. Insects, in many cases, have a higher instinctive capacity than the huge mammal. The bee, for instance, is more industrious and intelligent than the sheep or the ox. We cannot explain this anomaly; nor can we tell why, with similar bodies and only minute differences of internal organization, insects differ so widely among themselves. Bees and ants furnish an almost endless variety of phenomena; the ingenuity of these insects excels that of all other animals. We are further embarrassed when we seek the cause that operates in the same instinctive manifestations — the instinct of construction, for example—among animals possessing that capacity, as beavers, birds and spiders, or the various manifestations the same animal presents, as the constructive, maternal and social instincts of the bee and ant. However mysterious these phenomena, none dare say how far the intellect of man will yet unveil their secrets. Our hopes are sanguine that they will disappear like the mists before the morning sun.

I intend to employ the term manifestation in preference to that of instinct, the better to distinguish the cause from the effect. The effect I shall term a manifestation. When an animal builds its nest, its cell, or its shell, and when another makes traps to sieze its prey, what chiefly concerns our purpose is the modes of action, the appropriation of organs, and the means employed to attain an end. We must, however, not anticipate. We hope to study each instinct separately, and for next that of construction.

(To be continued.)

FLOTATION AND ROLLING OF FORAMINIFERA.

By Arthur Earland, M. Quekett Micros. Club.

WITH regard to the article in the November number of Science-Gossip, on the "Flotation and Rolling of Foraminifera," as a microscopist with several years' experience of these organisms, perhaps I may be permitted to give my experience upon the subject. The "nostrum," which Dr. Bryan quotes at the beginning of his article, is by no means an exploded one, but a method which is used by nearly all rhizopodists as a ready means of eliminating the bulk of a gathering, and incidentally of separating the more fragile and delicate species from their stouter congeners. Personally I can hardly understand how Dr. Bryan can have been so unfortunate in his results as to have been unable to obtain more than a few pinches of "floatings" from his material. In washing large quantities of my own gatherings, I have frequently separated several ounces of floatings at a time. As evidence of their purity and freedom from foreign matter, with such exceptions as I shall presently notice, I beg to enclose a few sample tubes for your inspection and acceptance.

I think Dr. Bryan lays far too much stress upon the action of capillarity, or the tension exercised by the surface-film of water. This undoubtedly exists, but I have seldom found it of much importance; and, except in the case of the finest grade of material, it can nearly always be overcome by shaking the vessel containing the water. The same capillarity which acts upon the smooth sand-grains must operate to an even greater extent upon the Foraminifera, many of which are covered with spines and ridges that must necessarily offer an increased resistance to the water. As soon, however, as the surface tension is overcome by the shaking of the vessel and the consequent moistening of the entire surface of the floating particles, the sand-grains sink from their superior gravity, while the Foraminifera, buoyed up by the air contained in them, continue to float, or remain suspended in the water, from which they may be separated by pouring it off through a strainer.

The floatings must not, however, be expected to contain all the species to be found in a gathering, for the larger and stouter Foraminifera are too heavy to float, even with the assistance of the air contained in the chambers. A few species, notably some of the Discorbinae and Truncatulinae, do not float for any length of time, owing to the large size of their foramina, which furnish the water with a ready means of access to the interior chambers. On the other hand, there are some Foraminifera which are practically unsinkable,

owing to their lightness and the absence of porosity in their tests. The period of flotation will consequently be found to vary greatly with different forms; for while many Foraminifera sink within a few minutes, and the greater number within twenty-four hours, there are others which are capable of resisting a prolonged immersion in water. In experiments that I made some years ago, I found a few Lagenae and Miliolinae still floating at the expiration of a fortnight, during which about ninety-nine per cent. of the originally floating Foraminifera had gradually filled and sunk. As a general rule muddy gatherings yield more floatings than sandy ones, and the Foraminifera float for a longer period. This is doubtless due to the preservative effect of the mud upon the sarcode body of the animal, which, filling the foramina, prevents the ingress of the water.

The method of washing the Foraminifera, etc., out of the sand by "rocking" the material under water, as described by Dr. Bryan, is very useful, and may be carried out with the material which remains after the withdrawal of the floating forams. I have found a half-plate size photograph developing-dish the most useful piece of apparatus for the purpose. By careful manipulation it is possible after rocking the Foraminifera into a pile in the corner of the dish, to pour them out into a wire sieve with a very small admixture of sand. If desired, the contents of the sieve can be rocked a second time and the sand entirely eliminated. The great drawback to the method is the fact that all objects of less specific gravity than the quartz sand come to the top under the rocking action of the water. Hence we find that the contents of the sieve include a large percentage of miscellaneous organic débris, especially in the case of shore gatherings or dredgings from shallow water near a coast line. The principal foreign ingredients are: (*a*) vegetable and animal débris, chiefly the woody fibres of vegetable tissues, fragments of algae, the insoluble residue of sewage, etc.; (*b*) coal and coke dust derived from the ashes thrown overboard from steamers; I have seen gatherings which were almost uniformly black from the large percentage of carbon contained in them; (*c*) Ostracoda, bryozoan and molluscan fragments, etc. The last may be disregarded as unavoidable and not objectionable; but the removal of the coke dust and vegetable débris must be effected, at any rate partially, and the task is a most difficult one. In fact I have not as yet succeeded in devising any method of separating them without at the same time losing a considerable percentage of the Foraminifera in the process. A large amount of the organic débris can be dissolved by the action of caustic potash, but much of it resists the prolonged reaction, and even boiling, in this solvent. The coal and coke particles, though equally objectionable, are of less frequent occurrence, being principally confined to shore gatherings made in the vicinity of ports and steamer routes, especially in the English Channel. Repeated rockings will eliminate them to a considerable extent, but owing to their size and specific gravity being approximately the same as those of many Foraminifera, neither rocking nor sifting will entirely remove them from a gathering.

The rolling method of separation mentioned by Dr. Bryan is invaluable for certain purposes; but as a method of separating organic débris from the washings, it can only be successful at the expense of sacrificing the bulk of those genera which, being more or less flattened in shape, will not roll off the card, For instance, *Cornuspira*, *Ammodiscus*, *Spirillina*, *Planorbulina*, and many other genera are flat on both sides, and will remain in position on a card tilted to quite a high angle, and long after much of the organic débris has rolled off. In fact I have found this rolling process a quick and easy method of obtaining specimens of these and similar species from gatherings known to contain them. The same method may be employed to obtain specimens of those more or less spheroidal forams which commence to roll off the card as soon as it is slightly tilted.

In the "Journal of the Queckett Microscopical Club" for November, 1897, will be found a paper on "The Preparation of Foraminiferous Material" in which I embodied the methods I have found most useful; and those of your readers who are interested in the subject, but have no practical experience, will, I think, find ample instruction in my remarks.

28, *Glenwood Road, Catford, S.E.*

Variations and Migrations of Mackerel.—An important paper by Mr. Walter Garstang, M.A., F.Z.S., the naturalist in charge of the Fishery Investigations of the Marine Biological Association, appears in the last number of the journal of that Association, issued in November. It occupies sixty pages, and deals most exhaustively with the racial differences of *Scomber scomber*. The American form of this fish differs very considerably from those found in European waters; but, though constituting distinct varieties or races, there is no reason to doubt their specific identity. The establishment of geographical or local races of mackerel settle several disputed points concerning the migration of this fish. It is proved that the mackerel does not make long migrations, as once thought. Neither does it cross the Atlantic. There seems to be little doubt that the varieties found in the Irish seas do not wander in winter far from their summer haunts. The North Sea fish of this species appear to winter in the English Channel, returning northward in spring.

ARMATURE OF HELICOID LANDSHELLS

AND A NEW SPECIES OF PLECTOPYLIS.

By G. K. Gude, F.Z.S.

(*Continued from page 172.*)

THREE specimens of an unnamed *Plectopylis* were submitted to me by Messrs. Sowerby and Fulton, who state that they have unfortunately no record of the origin of the shells. Upon examination I found them to belong to an undescribed form, and I have now pleasure in associating with this new species the name of Mr. G. B. Sowerby (1). The present shell is closely allied to *Plectopylis plectostoma* and *P. affinis*, a fact which

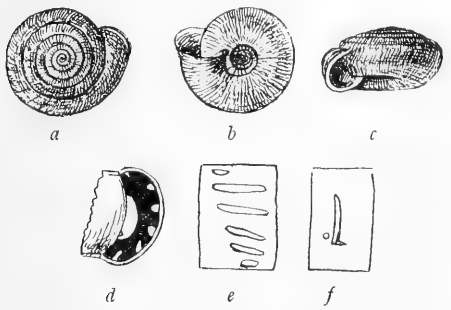


Fig. 93.—*Plectopylis sowerbyi.*

led me to re-examine my own specimens of these two species, and among a lot of *P. plectostoma* received from Miss Linter in 1891, labelled "Khasia Hills," I found a decorticated specimen which undoubtedly belongs to the new species.

(1) *Plectopylis sowerbyi*, n. sp. (fig. 93*a-f*.).—Shell sinistral, widely umbilicated, discoid, dark corneous, regularly ribbed and radiately distantly plaited, strongly decussated above by spiral ribs, less distinctly so below. Whorls six, narrow, increasing slowly and regularly, somewhat flattened above and rounded below, the last not descending in front. Six or seven spiral ridges, probably, when fresh, bearing rows of hairs, pass round the whole of the body-whorl, the first just above the slightly angular periphery, the others below it. Aperture ear-shaped; peristome slightly tinted with rosy-pink, scarcely thickened, and a little reflexed; the upper outer margin a little depressed; parietal callus slight, without raised ridge at the aperture. Umbilicus deep and wide. The parietal armature consists of a strong vertical plate, provided at its lower extremity with a short support anteriorly, and a small denticle posteriorly. The palatal armature is composed of six more or less horizontal folds, the first very slight and short, near the suture, the four next longer and more elevated, a little deflexed posteriorly, the sixth slight and very short.—Major diameter, 7-9 millimetres; minor diameter, 6·25–7·5 millimetres; altitude, 3·75-4·75 millimetres.—Habitat, Khasia Hills, Assam.—Type in my collection.

P. sowerbyi can at once be distinguished from *P. plectostoma* by the following characters: it is flatter, being less raised in the spire; the umbilicus is more open; there are only six whorls, the last not descending in front; the peristome is scarcely thickened and not much reflexed, and there is no raised ridge on the parietal callus. In the armature there are also important differences: the vertical parietal plate in *P. plectostoma* gives off from its upper extremity anteriorly a horizontal fold, which is absent in *P. sowerbyi*, where the plate in question is only provided with a support anteriorly and a denticle posteriorly below, and there is no horizontal fold below it; so that in this respect the present species differs from both its allies (see fig. 93*f*, which shows part of the parietal wall with its armature). The palatal armature is in one series, and consists of six horizontal folds. The first fold is very short and slight; the second longest; the third, fourth, and fifth each a little shorter than its predecessor; the sixth slight and very short (see fig. 93*e*, which shows the inside of the outer wall with its folds). All the figures are enlarged.

In addition to the specimen from the Khasia Hills, mentioned above, I possess an immature shell of unknown origin, which I also refer to *P. sowerbyi*. The last whorl of this specimen is nearly complete, but the armature, which is identical with that of the mature shells, is situate at half a whorl from the aperture.

Plectopylis alphonsi (fig. 94), from the Province

Fig. 94.—*Plectopylis alphonsi.*

of Monpin, Eastern Thibet, was described by Mr. G. P. Deshayes in the "Nouvelles Archives du Museum d'Historie Naturelle de Paris," vi. (1870), p. 22, and figured in the same work, ix. (1873), t. 2, figs. 22-24. The species has not hitherto been referred to the genus *Plectopylis*, but the palatal armature clearly indicates its generic position. Mr. Pilsbry ("Manual of Conchology," ix. p. 211) has placed the species in the genus *Eulota*, but this is doubtless owing to the fact that Mr. Deshayes makes no mention of armature in his diagnosis. Some time ago Mr. Gredler sent

me for inspection a single immature specimen from Kouei-Tchou, which he doubtfully referred to the present species. Mr. Mabille, who was kind enough to compare the shell for me with the type of *P. alphonsi* in the Paris Museum, has confirmed its identity with *P. alphonsi*, and subsequently the writer had an opportunity of inspecting the type specimen. Unfortunately there was only one specimen in the museum, so that I was unable to examine the details of the armature. Five horizontal palatal folds are visible through the shell-wall, but probably there are six folds, the first near the suture being seldom visible from without. In general form, as well as in the palatal armature, *P. alphonsi* appears to be allied to *P. stenochila*. The present species was described by Mr. Deshayes as follows:

"Shell depressed, orbiculate-discoid, thin, fragile, corneous-brown, yellowish-white, obliquely lineate and irregularly punctate; spire depressed, scarcely convex; whorls seven, narrow, sub-equal, finely plicate and concentrically sub-striate above; the last angulate above, convex below, polished, widely umbilicated; the perspective umbilicus a little deflected at the aperture; aperture semi-lunate, oblique, slightly compressed; peristome sinuous, reflected; columellar margin wide, with a dentiform thickening.—Major diameter, 9 millimetres; minor diameter, 8 millimetres; altitude, 3·5 millimetres."

Mr. Gredler's specimen, shown in fig 94*a–c*, has the peristome just formed, but is not quite mature. It does not possess any armature, but only shows a few denticles in that part of the shell where the palatal folds would be expected to occur; it has besides some traces of denticles at a spot where a former set of immature barriers might be expected to have existed. This is the first case of a *Plectopylis* without any armature which has come under my observation.

Plectopylis hanleyi was described by Lieut.-Col. Godwin-Austen, in the "Annals and Magazine of Natural History" (5) iv. (1879), p. 164. No figure has been published, and only one specimen is known. This is in the collection of Mr. Sylvanus Hanley, but I have been unable to inspect it, and I am therefore only able to copy the original description. The same remark, unfortunately, applies to the next two species.

The description of *Plectopylis hanleyi* runs thus:

"Shell sinistral, depressedly conoid, openly umbilicated, probably hirsute when young. Sculpture coarse, irregular, transverse ridges. Colour uniform ochraceous. Spire conoidal; apex blunt, smooth. Suture well marked. Whorls six, close-wound, convex; aperture semicircular, diagonal; peristome somewhat thickened, white, with a thin callus on the parietal margin [wall (?)] not to the extent of a ridge. Size.—Major diameter, 5·5; minor diameter, 5; altitude, 3 millimetres.

"Parietal vertical lamina simple; palatal plicae in two rows, four long in front, four short behind, and one basal long.

"This shell is very distinct; it has somewhat the form of *P. plectostoma*, but is not so angular on the periphery, while the internal plication is quite different, besides being so very much smaller in size. Sikkim (?); no history. Only one specimen, in the collection of Mr. Sylvanus Hanley."

Plectopylis vallata was described by Mr. Heude, in the "Journal de Conchyliologie," xxxvii. (1889), p. 45. I translate the description as follows:—

"*Helix vallata*. Shell discoid, laciniate at the periphery; below furnished with acute distant plaits, interspersed with minute striae trellis-like; lat. 10, alt. 5 millimetres. Tchen Keou. This *Plectopylis* recalls *P. stenochila*, but its dimensions are nearly double. Apart from the presence of the peripherial fringe, it may be stated that the inferior plaits are more numerous, and that their intervening spaces are trellised. These characters separate it from its congener of the right bank."

Plectopylis jugatoria was described by Mr. F. C. Ancey in the "Bulletin de la Société Malacologique de France," 1885, p. 127. The diagnosis may be thus translated:—

"Shell widely and deeply umbilicated, depressed, scarcely convex above, apex very prominent, somewhat solid, brownish-red, angulated, the upper oblique lines decussated with spiral ones (except at the apex), produced into laciniate cilia at the periphery; below smoother, spiral lines finer. Whorls six, slowly increasing, separated by a linear suture, almost flattened, the first altogether flat, the last widened around the umbilicus, strongly descending at the aperture, rather acutely angulated above, perspectively convex round the umbilicus below; aperture strongly oblique, not wide; semilunate; basal margin regularly rounded, scarcely angled at the periphery; peristome thickened and reflexed all round, but chiefly at the base, whitish; the margins connected by an appressed plate, on both sides at the junctions slightly channelled similar to *Helix achatina* Gray. Palate provided below with five parallel plates with another strong nail-shaped plate opposite the parietal margin; if others exist I have not been able to examine them.

"Major diameter, 12·5–13·25; minor diameter, 11·5–12; altitude, 5·5; width of aperture, 4·5 millimetres. Province of Kouei-Tchou.

"The shell which I have before me is a near relative of *Helix fimbriosa* Martens, of the Provinces Hoo-Nan and Kiang-Si. It can easily be distinguished from that species by the last whorl strongly descending at its extremity, its still more oblique aperture, the fine concentric striae of the lower surface, which is also marked with stronger lines of growth, and especially by the two margins of the aperture being united by a calcareous plate similar to that of the Indian *Plectopylis*, such as *P. achatina*, *leiophis*, *cyclaspis*, *brachyplecta*, etc. At the junction of the two margins exists a little channelled fold as in those species. I believe these internal plates are much like those in *P. fimbriosa*; but the small number of specimens which I had at my disposal did not allow me to sacrifice one to examine the fact completely."

Subsequently Mr. Ancey appears to have modified his view as to the nearest allies of *P. jugatoria*, for he informs me in a letter that this species is allied to *P. laminifera*.

(*To be continued.*)

A NATURALIST IN SOUTH-EASTERN EUROPE.

By Malcolm Burr, F.E.S., F.Z.S.

(*Continued from page* 210.)

On July 27th we left Sarajevo, and arrived at the little village of Konjica about midday, after passing through the fine scenery of the Ivan Planina. In the afternoon we were invited to play lawn tennis with the Austrian officials. We accepted, and very incongruous it seemed, in a valley surrounded on all sides by impressive mountains. Konjica is on the borderland between Bosnia and Herzegovina, situated in a fertile valley between the Ivan Planina and the great Prenj group. We started on the following morning for a collecting excursion in the neighbouring mountains, to a place named Tisavica. We walked for two or three hours through the fertile zone, where kukuruz, or maize, and plums are grown in large quantities, then coming to the commencement of the barren region. We came out through a stony valley to a ridge of hills with snow on the tops. Up here we climbed, to find we had yet to cross a long and dreary valley composed of nothing but boulders of limestone, white and shining like snow. The only signs of vegetation were some tufts of grass struggling up between the rocks.

Near Konjica.

In this uninviting place we took *Satyrus* sp., *Erebia melas*, *Stenobothrus miniatus* Charp. in some numbers, and *Gomphocerus sibiricus* L.

Erebia melas is a very handsome butterfly on the wing, the rich black velvet colouring showing up well against the white stony background. *Gomphocerus sibiricus* L. is a quiet species, hopping about among the rocks, not very noticeable, and the stridulation is low and short. They were only numerous at one corner of the wilderness where the elevation was about 1,500 mètres. According to Brunner it never occurs below 1,200 mètres.

Over this ridge at the end of the plateau was a little sheltered dell in which grew nettles and weeds. Here I took in some numbers a new species of *Platycleis*, in appearance very like *P. brachypterus*, which is common on our heaths and moorlands. This novelty seems to be very restricted in distribution, for though I searched carefully I took it nowhere else except in this little spot among the nettles. About a mile away in a similar hollow, I captured what may be either another new species or a local form or variety of the last. In this place, too, were numbers of *Podisma pedestre* L.

The scenery from this point was very fine. Beneath us lay a deep and rocky valley, the side near us clothed with pines, the rest barren. On the far side was the rounded head of Crnoglav, or Blackhead, visible from many miles around, and away on the left the rugged peak of Ortish,

Near Tisavica.

black and absolutely barren, with snow nestling in the sheltered corners, but no sign of life.

In the valley beneath us lay our destination, Tisavica (pretty), to which we descended by a precipitous and zigzag path through the pines. After toiling down here for some time we at last came to the bottom, where we found ourselves at the head of a very grand and desolate valley. There was a little vegetation at our end, but among it were *Stenobothrus miniatus* and species of *Lycaena* and *Colias* of which I am ignorant. As we advanced we left all vegetation behind, saving a few scattered pines and occasional patches of turf. Over a mile away we found a few shepherds' huts inhabited by a family of mountaineers, who were occupied in tending a flock of a thousand mountain sheep and a few cattle, which managed to eke out a living on the bits of grass that forced a way up between the stones. Water had to be brought in a heavy barrel from a well or spring across the other side of the valley. Insect life was scarce. I observed now and then an *Erebia tyndarus* and some beetles. There were a few birds, occasional rock thrushes and Alpine choughs, and as I lay down to sleep on the stones I heard chamois snorting in the mountains around.

The following morning we climbed to the summit of Ortish. On a grassy patch at the base I took *Stenobothrus bicolor* Charp. and *Erebia tyndarus*. As we neared the summit we had a splendid view of eight chamois leaping across a snow slope ahead of us, making a great clattering as they upset stones in their course before they disappeared around the hillside. From the peak itself we saw two more. The panorama was very striking. Excepting a fine view of the fertile valley of the Narenta, all around was barren limestone hills and valleys; it was impressive scenery, but, I should imagine, likely to become monotonous. The height of Ortish is 2,019 mètres, and we melted snow to drink for luncheon.

We returned at midday to the huts, and in the afternoon left for Konjica. It was a long and tiring seven hours' walk, down through a wood by the Basicha, a stream which runs into the Narenta. In this river I took numbers of *Gerris thoracicus* Schumm, and in the wood a handsome longicorn beetle, with pale-blue rings on the antennae.

On July 31st we started to walk to Mostar over the mountains—a three days' march. On the first day little or no collecting could be done owing to the rain, but I observed *Oedipoda miniata* Pall., and took a fine longicorn, *Morimus funereus* Muls. As we toiled through a wood near the village of Borke, we saw a great black woodpecker (*Picus martius*). Being apparently a young bird, it failed to live up to its reputation for shyness, as it flew in an undulating flight from tree to tree, keeping a few yards in front of us. It settled on one trunk by the path, affording a beautiful side view, displaying a very handsome creature, black as jet, with a crimson crest. The bird was about the size of our common green woodpecker (*Gecinus viridis*).

Our halting-place that evening was Glavatichevo, a village eight hours' walk from Konjica, in the beautiful valley of the Narenta. Our hotel was the gendarmerie station, where we were made extremely comfortable by the Croatian gendarmes who patrol the district.

The following morning, at six, we started, leaving the valley to climb the last part of the great Prenj group, where we had been wandering during the last few days. As we climbed the sides of the hill, Mr. Witty took *Aegosoma scabricorne* Scop. under bark, a very large and handsome longicorn. When we reached the summit, we saw a great barren limestone plateau stretched out in front of us. It looked desolate enough, but collecting was very successful, for every now and then we came to a little shaded hollow, full of rough herbage and weeds, well occupied by insect life.

At a spring called Bicevica we halted for lunch, and collected around. *Erebia melas* was fluttering about, and in the little hollows I took several interesting Orthoptera: *Thamnotrizon transsylvanicus* Fisch. (numerous), *T. fallax* Fisch. (less so), and *Poecilimon elegans* Br. I found another new species of *Platycleis*, allied to *P. fusca*, with abbreviated wings, also *P. grisea* Fab., *Stenobothrus nigromaculatus* Krauss, *S. parallelus* Zett., an immature *Ephippigera* sp., *Stethophyma brevipenne* Br., and the very handsome *S. fuscum* Pall., a conspicuous insect, its bright colours and the clattering of its wings in flight betraying it at once.

As we left this spot three huge vultures sailed slowly overhead into the valley beyond. When we crossed the brow of the hill we found the fauna and flora much more varied, the south aspect being apparently richer than the north side in these mountains. We descended through the tiny village of Ruishte, where *Gryllus desertus* Pall. and *G. fieberi* were numerous. In addition to all the species that were common at Bicevica, we took numbers of *Oedipoda caerulescens* and *O. miniata*, *Ephippigera sphacophila* Krauss, *Platycleis tessellata* Charp., and among the butterflies, *Satyrus circe*, *S. briseis*, and *Epiphinele lycaon* were abundant.

In a commanding position above the village is the gendarmerie station, where we again halted for the night. It was surrounded by wood, chiefly beech, in which *Ectobia lapponica* was abundant. Mr. Oldfield Thomas had supplied me with traps to collect small mammals for the British Museum, and here I set them, baited with toasted cheese, but did not take any. In fact, in the woods there was little sign of life except the cockroach above mentioned.

On August 3rd, leaving Ruishte for Mostar, we began to descend almost at once to the Mostarsko

Polje, through which the Narenta runs. As we went down the sides of the hill I took *Poecilimon elegans* Br. and immature *Pachytrachelus striolatus* Fieb., and further down we heard the first large *Cicada* chirping. At the bottom *Lycaena icarus*, *Satyrus briseis* and *Pieris ergane* were numerous. We walked on to a village called Vojno, where we waited for a train to run us into Mostar. As we waited, Mr. Witty and myself had a glorious dip in the Narenta, and we found the clear and swift-running stream put new life into us after the tiring walk of the day. The train brought us into Mostar about seven o'clock in the evening.

Early next morning Mr. Witty left us for home, and so Mrs. Nicholl and I made an excursion to Blagaj to collect. This is a small village situated at the foot of a hill called Velez, practically surrounded by mountains, all stony and grey. The heat was oppressive, as the glare reflected from the rocky hillsides, and reflection made the natural heat of the district something like tropical. Among some pomegranate bushes there were numbers of *Phaneroptera quadripunctata* Br. and *Macronemurus appendiculatus* Latr. Further on we found insect life most abundant. Collecting was extremely difficult owing to the thorns. I have never seen such a prickly place, the vegetation consisting chiefly of tough pomegranates, which tear one's clothes and nets to shreds. In Orthoptera I took *Truxalis nasuta* L., *Acridium aegyptium* L. (larva), *Platycleis modesta*, *P. sepium* Yers, *Decticus albifrons* Fabr., *Oedaleus nigrofasciatus* De Geer., *Pachytrachelus striolatus* Fieb. and *Gryllomorpha dalmatinus*, in addition to the usual species, such as *Stenobothrus nigromaculatus*, *S. dorsatus* and others. In Lepidoptera we captured *Melanargia larissa* *Pieris ergane*, *Melitaea didyma*, *Leucophasia sinapis* *Satyrus statilinus* and *S. dryas*. In Neuroptera I took the great ant-lion *Palpares libelluloides* L., and among dragonflies *Orthetrum cancellatum* L., *Sympetrum sanguineum* and *Anax formosus*. The natives were very interested in watching us, but could not understand our object in catching grasshoppers. The Serbian name for grasshopper is apparently onomatopoeic, being "skakavats," while cricket is "tsvrchak." *Decticus albifrons* was numerous in a Turkish churchyard. It stridulated loudly in the middle of a thorn bush, and the only way to get it out was to fire the bush, which was dangerous, as the grass was altogether dried up and withered. However, by this means we took some, and succeeded in keeping the fire within our control. On the hill Velez, above Blagaj, is a ruined castle. It was originally the stronghold of Stepan Grad, one of the last of the heretic Bogomiles to hold out against the Turk, but was subdued in the year 1483.

On August 5th, in the hope of catching some aquatic insects, I walked to the swampy Mostarsko Blato and the Lake of Mostar. Here I took a single *Gerris*, but no other aquatic insects. Frogs were extremely numerous, and I saw many dragonflies that I was unable to take, also *Pachytylus* sp. that were too active for me. Among the thorny bushes at the foot of the hills the huge hymenopteron *Scolia quadrimaculata* was extremely numerous, and *Decticus albifrons* was chirping all along the hedge. No other Orthoptera were observed except the common *Oedipoda caerulescens* and *O. miniata*. I walked back in the evening through the village of Radobolje, putting up on the way a brace and a-half of partridges from among the rocks, and left Mostar the following morning for Dalmatia.

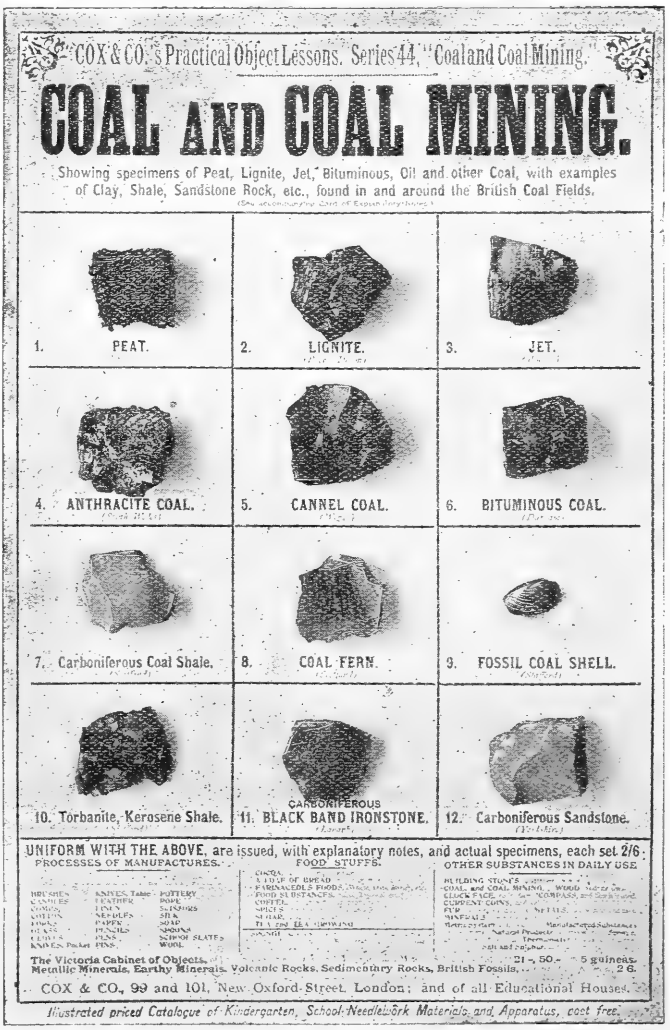
(To be continued.)

EDWIN DUNKIN, F.R.S.

WE regret to note the death of Edwin Dunkin, the third son of William Dunkin, of "The Nautical Almanac" office. He was born at Truro, August 19th, 1821. His education was conducted partly in England and partly in France. In 1838, at the age of seventeen, he entered Greenwich Observatory, three years after Airy became Astronomer Royal, as a computer, engaged in the systematic reduction of the lunar observations since the time of Bradley. After helping in its formation, he became assistant in the Magnetic and Meteorological Department. He was later transferred as assistant in the Astronomical Department. Mr. Dunkin was sent to Christiana, in Norway, to observe the total solar eclipse of July 28th, 1851. He had charge of the expeditions to determine the longitude of Brussels, in 1853; Paris, in 1854; and Valentia, in Ireland, in 1862. In the autumn of 1854 he had sole charge of the pendulum experiments arranged by the Astronomer Royal, at a depth of 1,260 feet, in the Harton coal mine, near South Shields, to determine the mean density of the earth. At this depth the force of gravity was found to be increased $\frac{1}{19000}$. In 1845 Mr. Dunkin was elected a Fellow of the Royal Astronomical Society, and served as its Hon. Secretary from 1871 to 1877, and was its President from 1884 to 1886. He contributed numerous papers to its "Transactions," besides the obituary notices of many of its Fellows, including that of Sir John Herschel. He was elected a Fellow of the Royal Society in 1876, and from 1879 to 1881 was a member of its Council. In 1889 he was elected President of the Royal Institution of Cornwall. On the resignation of Sir George B. Airy from the post of Astronomer Royal, in 1881, Mr. Dunkin became Chief Assistant at Greenwich Observatory, where he remained until 1884. Amongst his published works none is better known than "The Midnight Sky," which gives pictures of the heavens for all times of the year. He passed away, after a few months' illness, at Blackheath, on November 26th, leaving a widow and one son.

PRACTICAL OBJECT LESSONS.

WE recently had an opportunity of inspecting the excellent series of practical object lessons prepared by Messrs. Cox and Co., of New Oxford Street, London. As aids to the teachers of young people we cannot imagine a more satisfactory or useful plan than that adopted by this firm. Those which naturally first appealed to us were the elementary geological series, consisting of twenty examples of minerals under various groups, such as the metallic minerals, earthy minerals, igneous rocks, sedimentary rocks, British fossils, and coal. To explain our meaning we give an illustration of the latter series. The specimens are mounted upon cards. With these objects as the text, teachers find no difficulty in preparing elementary discourses far more interesting to the pupils than the most elaborate descriptions set forth in books. With regard to the trustworthiness of the various geological collections, it may be mentioned that they have been prepared under the direction of a gentleman connected with the geological department at South Kensington. The firm also supplies more elaborate series arranged in small hardwood cabinets. On inquiry we find that the chief applications for these practical object lessons come from the middle-class and higher grade Board schools. It was unexpected to hear that recently three hundred sets had been forwarded to the order of the educational authorities of the island of Malta. The same principle of practical lessons has been extended by Cox and Co. to the arts and manufactures. The whole forms an admirable means of imparting elementary education on the origin of or manner of producing common objects familiar to every scholar. For instance, in the case of flax, specimens are attached to the card, exhibiting in the first place the flax plant, then its various stages of preparation, until it reaches a piece of fine linen. Many other subjects commonly met with by boys and girls are treated in the same manner, including table-knives, buttons, silk, etc., one of the most attractive being the stages of manufacture of a needle. We imagine that this series might be extended with considerable advantage by Messrs. Cox. For instance, economic entomology could be easily represented. Cases showing the work of the hive bee and of insects injurious to crops would be useful in village schools.



THE Royal Meteorological Society remove their headquarters on January 2nd, from the Institution of Civil Engineers, to Prince's Mansions, 70, Victoria Street, Westminster.

THE death is announced, at Grasse, of M. Jacques Passy, whose interesting researches on the chemistry of perfumes attracted much attention, especially as regards the physiological action of scents.

THE ninth annual announcement of the Garden scholarships to be awarded at the Missouri Botanical Garden has been issued. These scholarships are worthy of greater imitation in this country.

A SERIES of lectures, to commence on January 11th, will be given at University College, London, on the Morphology and Histology of the vascular system. Each lecture will be followed by practical work or demonstration.

THE Technical Education Board of the London County Council have drawn up a report for presentation to the Council, dealing with the advisability of the Board assuming responsibility for all science and art instruction within the County of London.

THE Official Journal of France published a decree on December 1st, prohibiting the importation into France of trees, shrubs, etc., from the United States. The object is to prevent the introduction of *Aspidiotus perniciosus* the San José scale-insect, well known on account of its ravages in America.

PROFESSOR F. JEFFERY BELL will give a short course of lectures, suitable to children, at the Society of Arts, on January 4th and 11th, at 7 o'clock, the first subject being "Hands and Feet"; the second lecture will be on "How some Animals Breathe."

MISS CATHERINE BRUCE has placed in the hands of Prof. J. K. Rees, of Columbia University, the funds necessary for the purchase of a special photographic telescope to be mounted at Helsingfors, Finland, to be employed in making polar trail plates for Dr. Jacoby, under the direction of Prof. A. S. Donner.

AT the meeting of the Royal Society, on December 15th, Professor Dewar gave an account of some of his recent experiments in liquid hydrogen, especially its use as a rapid condenser. He found that if a tube of air were immersed in liquid hydrogen, the contents would quickly become solid.

THE Imperial Academy of Sciences at Vienna has issued a comprehensive work on the bubonic plague. It consists of the reports of the Austrian Medical Commission despatched to Bombay in January, 1897, and contains, in the first part, a general account of the work, the second being occupied by a scientific report by the ill-fated Dr. Hermann Müller, who himself recently fell a victim to this terrible disease.

THE Seventh Annual Exhibition of the North London Natural History Society will be held on December 31st, 1898, and January 2nd, 1899, at the Sigdon Road School, adjoining Hackney Downs Junction station.

THE newspapers are recording the slaughter in Tor Bay, in Devonshire, of a man-eating shark, three feet nine inches in length. There was not much room inside that shark for the man.

MESSRS. R. & J. BECK & CO., LTD., have made a feature for the coming microscopical season of their "British Students'" microscope. The stand only is supplied in mahogany case for 51s. 6d. The eye-pieces and object-glasses being extra, according to requirements or means of purchasers.

WE understand that the very beautiful micro-photograph of a bee-louse, which appeared on page 176, was the work of Mr. Edward Horsnaill, of Dover, and formed one of a series by that gentleman. We hope on a future occasion to have the pleasure of showing to our readers others of them, as he has sent us an interesting packet of examples.

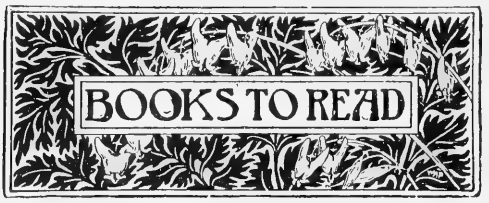
THE seventh International Geographical Congress will be held at Berlin, from September 28th, to October 4th, 1899. The Council of the Society at Berlin has issued a circular inviting the friends and promoters of geography in all countries to attend. Correspondence should be addressed to the office of the Seventh International Geographical Congress, 90 Zimmerstrasse, Berlin.

MANY of our readers who have admired Mr. Richard Kearton's works, so beautifully illustrated from life, will regret to know that he has, acting on medical advice, been obliged to retire from his business occupations. We trust that the throat affection from which he is suffering is of a temporary character, and that he may soon be able to continue his Nature studies.

MESSRS. LONGMANS, GREEN & COMPANY'S "Notes on Books," dated November 30th, being No. 175, is the most literary of all the publishers' catalogues. Unfortunately the firm has not issued many scientific books this autumn; the most important being Mr. Beddard's "Structure and Classification of Birds," which we have already noticed in "Books to Read." There are a number of others to be obtained for general reading.

A MEMORIAL has been prepared for presentation to the Duke of Devonshire, Lord President of the Council, and to Mr. Ritchie, President of the Board of Trade, protesting against the proposed removal and distribution of the Buckland Fish Museum, at South Kensington, a collection which was brought together by the late Mr. Frank Buckland. The protest has already been signed by the chairmen of the leading fishery boards and other associations throughout the country, and by individuals interested in fisheries.

WE regret to notice the death of Prof. George James Allman, M.D., F.R.S., formerly Regius Professor of Natural Science in the Edinburgh University. He died at Parkstone on November 24th. His special work was the investigation of the lower organisms of animal life. The large collections of Hydroida made during the voyage of the "Challenger" were handed to Dr. Allman for determination and description. His name was one well known to naturalists about the middle of this century, by whom he was held in great respect not only for his ability, but also his kind-heartedness.



NOTICES BY JOHN T. CARRINGTON.

NOTE.—*In consequence of the great variety in sizes of books now published, the old descriptions, founded on the folding of the paper on which they are printed, will not in future be followed in these pages. In its stead their size, including binding, will be given in inches, the greater being the length and the lesser the breadth, unless otherwise specified.*—*Ed.* SCIENCE-GOSSIP.

The Study of Man. By ALFRED C. HADDON. x. + 512 pp. 8½ in. × 6 in. with 40 illustrations and 8 plates. (London: John Murray; New York: G. P. Putman's Sons. 1898.) 6s.

This work—one of the Progressive Science Series—is excellently written by Professor Haddon, than whom few are better able to deal with a popular handbook of Anthropology. His first chapter indicates the importance of measurements in that science. He then proceeds to the value, in studying different races, of hair and eye colour, also of head form and the nose. Thence he proceeds with a chapter on the ethnography of a district in France, as an example for study. Next, Professor Haddon deals with the rise of civilization as represented by the evolution of wheeled vehicles, taking the cart and the Irish jaunting-car as examples. The latter part of the work is devoted to a critical study of the toys and games played by children in various parts of the world, among savages and with the more highly civilized races. The work ends with an important chapter containing "Practical Suggestions for conducting Ethnographical Investigations in the British Isles." Written by such an able exponent of the subject, Professor Haddon's "Study of Man" cannot fail to command the highest attention.

Flashlights of Nature. By GRANT ALLEN. 312 pp. 7¾ in. × 5¼ in. with 150 illustrations by FREDERICK ENOCK. (London: George Newnes, Ltd., 1899.) 6s.

Some of the matter contained in this book has already appeared in the "Strand Magazine," but is here reprinted with corrections and additions, forming, with Mr. Enock's beautiful and accurate illustrations, a charming addition to any person's library. Written in Mr. Grant Allen's well-known popular style, it cannot fail to be attractive to the public at large, as well as to the initiated in the subjects forming the chapters. Among these are a couple on ants, one entitled "A Plant that Melts Ice," another "A Beast of Prey," followed by a "Woodland Tragedy," "Marriage among the Clovers," and several more. They are all attractive, many being very suggestive to the thinking layman, and cannot fail to create a taste for critical examination of Nature's mysteries. We are pleased to notice that Mr. Allen refers in eulogistic terms on page 72, to the cover of SCIENCE-GOSSIP, which was designed by Mr. Worthington Smith so long ago as 1865, when the publisher, Hardwicke, founded this magazine. The chapter on "Marriage Among the Clovers," forms one of the nicest lessons in botany, that could be desired. This book will doubtless gladden many young people as a seasonable present, as it is one to cultivate the tastes for science and art.

Organic Evolution Cross-examined. By the DUKE OF ARGYLL, K.G., etc. 201 pp. 7¾ in. × 5½ in. (London: John Murray, 1898.) 5s.

There are only three chapters, which originally appeared as magazine articles in the "Nineteenth Century," and they are now reissued in book form. Doubtless most of our readers have already seen the series, which in this form are little altered. They deal, as indicated by the title, with the much debated subject of evolution in plant and animal life. In the May number, 1897, of the "Nineteenth Century," these papers were criticised by Mr. Herbert Spencer; but as his Grace the Duke of Argyll appears to think that some of Mr. Spencer's remarks were founded on misconception, he has altered certain paragraphs herein, to make his meaning more explicit. Critical biologists should of necessity examine the arguments contained in this work.

A New Astronomy. By DAVID P. TODD, M.A., Ph.D. 480 pp. 7½ in. × 5½ in. with 6 coloured plates and numerous other illustrations. (London: Sampson Low, Marston & Co., Limited, 1898.) 7s. 6d. net.

We have already had occasion (SCIENCE-GOSSIP, N.S. vol. iv. p. 328) to notice this beautifully produced popular work on astronomy. The author, Professor of Astronomy and Director of the Observatory at Amherst College, U.S.A., has successfully designed an attractive work, intelligible to all, on this most fascinating science. We welcome this, a further issue of the work.

Recent Advances in Astronomy. By ALFRED H. FISON, D.Sc. vi. + 242 pp. 7½ in. × 5 in. with 12 diagrams. (London, Glasgow and Dublin: Blackie and Son, Limited, 1898.) 2s. 6d.

In their Victorian Era Series, of which this volume is one, Messrs. Blackie and Son have instituted a useful short history of the progress made during the century so soon to expire, in politics, economics, religion, industry, literature, science and art. Dr. Fison popularly places before his readers, not so much the discoveries of the age, as the recognised position of the science of astronomy. He describes what is understood by it, as is indicated through the chapter headings, "The Life of a Star," "Measurement of Stellar Distances," "The Milky Way and the Distribution of Stars," "The Recent Study of Mars," etc. Dr. Fison's book will be useful to the layman as well as to the astronomer.

The Century Invalid Cookery Book. By MARY A. BOLAND. Edited by Mrs. HUMPHRY. ix. + 320 pp. 7¼ in. × 4¼ in. (London: Fisher Unwin, 1892.) 3s. 6d.

Cookery for invalids is clearly a science, unless the poor sufferers are to be too rapidly "cured" by those undesirable persons said to be sent to us by the arch-enemy. We, therefore, have pleasure in noticing a most useful book for nurses and private persons who have to attend the sick. The idea was suggested to the author by the necessities of a large hospital in America. She has certainly produced by far the most scientific treatise on cookery we have seen. The first part is devoted, in the form of Explanatory Lessons, to the chemical properties and action of various classes of foods. The second section deals with proper recipes, menus and general directions for particular classes of sickness. Mrs. Humphry, who, by the way, is "Madge" of "Truth," in editing the American edition, has synchronised the names of ingredients and other points with English customs.

Wild Life at Home. By R. KEARTON, F.Z.S. 188 pp. $7\frac{3}{4}$ in. × $5\frac{1}{2}$ in. with 100 full-page and other illustrations. (London, Paris, New York and Melbourne: Cassell & Co., Limited, 1898.) 6s.

On former occasions we have had pleasure in noticing the very artistic work produced by Mr. Kearton, and though less pretentious than his former productions, the one before us is more interesting to general naturalists and lovers of country lore. The object of the author in this work has been to give popular instructions for studying wild life and obtaining photographs of even the shyest members of our native fauna. In it Mr. Kearton describes how he and his brother proceeded to obtain such superb photographs as those illustrating this and his former works. The first chapter is one of general advice and description of apparatus necessary. Among the chief of these is an artificial tree trunk, arranged to cover the operator with his camera. Having placed this shield in position, the birds or other creatures soon become accustomed to its presence, when successful pictures can be taken of their natural habits and home life. By permission of the publishers, we reproduce one of the larger illustrations, showing a beautiful aberration of a blackbird, with its nest. We have selected this picture on account of the beauty of the bird represented, but there are many others which far exceed it in artistic value. One of the best is from a small photograph on page 34, representing a shag stretching herself. The position of the bird, though eccentric, is most natural. The volume is not entirely devoted to birds, for the last chapters include mammals, insects, spiders mollusca, reptiles, fish and marine objects. It is full of anecdotes, and exhibits throughout great capacity for observation and power of description. "Wild Life at Home" is one of the very best books on country subjects that has come before us. The letterpress is crisply and pleasantly written, suggestive of many sunny days in wild places.

PIED BLACKBIRD FEEDING HER CHICKS.
(From Kearton's "Wild Life at Home." Cassell & Co., Ltd.)

CONDUCTED BY FRANK C. DENNETT.

1899.	Rises.	Sets.	Position at Noon. R.A.	Dec.
	Jan. h.m.	h.m.	h.m.	
Sun	... 7 ... 8.6 a.m.	... 4.7 p.m.	...19.14	... 22° 22′ S.
	17 ... 7.59	... 4.22	...19.57	... 20° 44′
	27 ... 7.48	... 4.39	...20.39	... 18° 26′

	Rises.	Souths.	Sets.	Age at Noon.
Jan.	h.m.	h.m.	h.m.	d. h. m.
Moon 7 ...	3.10 a.m.	... 7.32 a.m.	...11.45 a.m.	25 0 17
17 ...	10 2	... 5.1 p.m.	...12.17 p.m.	5 13 10
27 ...	5.47 p.m.	... 0.19 a.m.	... 7.43 a.m.	15 13 10

	Jan.	Souths. h.m.	Semi Diameter.	Position at Noon. R.A. h.m.	Dec.
Mercury ...	7 ...	10.27 a.m.	... 3″ 6	... 17.35	... 21° 5′ S.
	17 ...	10.32	... 3″ 0	... 18.18	... 22° 41′
	27 ...	10 50	... 2″ 7	... 19.17	... 22° 56′
Venus ...	7 ...	9.15 a.m.	... 20″ 1	... 16.23	... 16° 50′ S.
	17 ...	9.3	... 17″ 2	... 16.50	... 17° 46′
	27 ...	8.58	... 14″ 9	... 17.24	... 18° 52′
Mars ...	7 ...	1.21 a.m.	... 7″ 1	... 8.26	... 23° 28′ N.
	17 ...	0.26	... 7″ 2	... 8.10	... 24° 33′
	27 ...	11.24 p.m.	... 7″ 0	... 7.53	... 25° 22′
Jupiter ...	17 ...	6.38 a.m.	... 16″ 4	... 14.24	... 13° 3′ S.
Saturn ...	17 ...	9.28 a.m.	... 7″ 1	... 17.15	... 21° 39′ S.
Uranus ...	17 ...	8.34 a.m.	... 1″ 7	... 16.20	... 21° 20′ S.
Neptune ...	17 ...	9.39 p.m.	... 1″ 3	... 5.28	... 21° 54′ N.

MOON'S PHASES.

		h.m.			h.m.
3rd Qr. ...	Jan. 5 ...	3.22 a.m.	*New* ...	Jan. 11 ...	10.50 p.m.
1st Qr. ...	,, 18 ...	4.36 p.m.	*Full* ...	,, 26 ...	7.34 p.m.

In perigee January 12th, at 2 a.m., distant 222,100 miles; and in apogee on 25th, at 6 p.m., distant 252,500 miles.

CONJUNCTIONS OF PLANETS WITH THE MOON.

Jan. 6	... Jupiter	... 11 p.m.	... planet	6° 6′	N.
9	... Venus	... 2 a.m.	... ,,	7° 26′	N.
9	... Saturn	... 7 p.m.	... ,,	3° 11′	N.
10	... Mercury	... 7 a.m.	... ,,	2° 56′	N.
25	... Mars	... 12 p.m.	... ,,	6° 11′	N.

THE SUN still has considerable spots frequently visible on his disc. A partial eclipse of the sun occurs on January 11th, from 8.54 p.m. until twenty-two minutes past midnight, but only visible in and near the North Pacific Ocean.

MERCURY is too far south for successful observation, notwithstanding that he is at greatest elongation west (23° 35′) on January 12th at 2 a.m., and then rises 1h. 42m. before the sun.

VENUS is also very low in altitude, but is at her greatest brilliancy on the 6th, at 7 a.m. She rises all the month more than three hours earlier than the sun.

MARS, coming into opposition at 12 p.m. on the 18th, is at its best for observation this month. It rises at 5.36 p.m. on the 1st, and earlier each evening. This is not one of the most favourable oppositions, seeing that the apparent diameter does not exceed 14·4″. On the other hand, the planet is in good position owing to its considerable northern declination.

JUPITER can only be observed in the morning, as it does not rise until 2.35 a.m. on the 1st, and 0.54 a.m. on the 31st. Its great southern declination militates against successful observation.

SATURN and URANUS are too near the sun for observation.

NEPTUNE is still in good position, and on January 7th to 9th will be in transit across the Crab nebula, R.A. 5h. 28m. 21s., Dec. N., 21° 57′, about 1½° north-west of ζ Tauri, a phenomenon believed to be unique, and to which attention was first called by the late Herbert Sadler.

METEORS may be specially looked for on January 2nd and 3rd, radiating from a spot in R.A. 15h. 20m., N. Dec. 52°, between Böotes and Draco; also on the 21st and 31st.

AFTER many unsuccessful attempts, Captain P. B. Molesworth, Director of the Zodiacal Light Section of the British Astronomical Association, has succeeded in taking a photograph of the zodiacal solar appendage.

NEW COMET.—Prof. P. E. Chase, of Newhaven. Conn., discovered a faint comet situated in the Constellation Leo, in R.A. 10h. 7m. 4s., N. Dec. 22° 55′, on November 14th, at 12.38 local time. On the morning of the 24th, Mr. Coddington, at the Lick Observatory, found it in R.A. 10h. 21m. 48s., N. Dec. 23° 37′. It is said to be brightening.

HERR WITT'S new planet has been hitherto known provisionally as DQ, but Prof. S. C. Chandler suggests Pluto as an appropriate name, and a helmet as a good symbol, in memory of the one forged for his concealment by Vulcan.

SIX new minor planets have been discovered by Prof. Max Wolf, of Heidelberg, two, the first and last, in conjunction with Herr Schwassmann, the rest with Herr Villiger. Three were found on November 6th, one on the 13th and two on the 19th. M. Charlois, of Nice, also discovered one on November 8th. If these all prove to be new, the total number known are now 443.

GREAT SUNSPOT OF SEPTEMBER.—This was seen by the writer, at 2.30 p.m. on September 15th, as a constant indentation on the limb amidst the ripple. The spot thus seen on the limb was photographed at Greenwich, and also by Mrs. Newbegin, who exhibited the picture, together with other photographs, at the last meeting of the British Astronomical Association.

MR. W. F. DENNING, in "Nature," of December 1st, mentions that he has been comparing several drawings of spots similar in character to the red spot which have been seen on dates ranging so far apart as September 5th, 1831, and July 30th, 1898, nearly sixty-seven years. During these 24,435 days the planet has made 59,071 rotations, at a mean rate of 9h. 55m. 36·2s. Mr. Denning asks for copies of drawings, or the loan of originals, showing similar markings made during the period prior to 1869. The spot sometimes appeared as an oval ring.

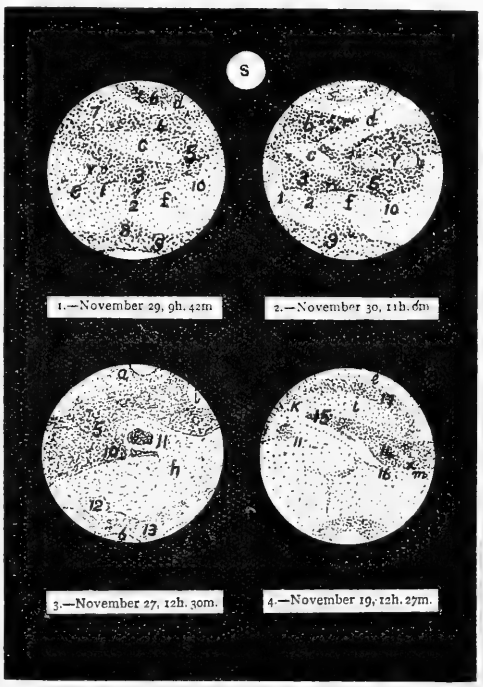
THE LEONIDS.—MM. Janssen and Hausky ascended in a balloon at 2 a.m. on the morning of November 14th, to a height of 200 mètres. From 2.45 to 4.30 only twenty-five Leonids were observed. At Lyons Observatory the weather was favourable. M. André made useful observations from 8 till 12.15 p.m. on the 13th, thirty-four meteors being noted, of which twenty-two were Leonids. M. Guillaume took up the watch from 1.4 a.m. until 4.5 on the 14th, observing 134 meteors, radiating apparently from 155° + 18°. On the morning of the 15th Prof. C. A. Young, of Princeton, with an assistant, observed 100 Leonids, and 200 meteors were seen at Yerkes Observatory, where thirty were photographed by Dr. W. L. Elkins.

CHAPTERS FOR YOUNG ASTRONOMERS.

By Frank C. Dennett.

THE PLANET MARS.

The planet Mars, being our nearest celestial body of large magnitude, with the exception of the moon, naturally attracts much attention. He is in opposition to the sun about once in two years, but is not always at that time an equally imposing object. His apparent diameter then varies considerably. At its best it reaches 29″·5, but sometimes only 13″. This variation is due to the eccentricity both of the earth's orbit and that of Mars, which causes considerable difference in the distance separating the two planets at the time of opposition. The most favourable oppositions, when the planets are closest to each other, occur at intervals of about fifteen years, the next being in the summer of 1907; but at these times Mars has always a southern declination, which is unfortunate for observers in northern latitudes. Mars is the only superior planet which shows anything like a distinct phase; the gibbous phase being in this case very marked, both before and after opposition.



Planet Mars.

It was early observed that Mars had spots on his surface, and as far back as 1659 Huygens discovered the rotation-from these marks. The more brilliant-portions of the planet, which are usually believed to be land, have a bright reddish tint, and cover the greater area of the disc. The darker sections, seas, as they are called, have a very decided greenish or bluish tint. Some observers have held the opinion that this may be a result of contrast. These indications may be seen, under favourable circumstances, with very moderate means, for an excellent series of drawings were made some years since by Mr. Charles Grover with a telescope of only two inches aperture. The diagrams given herewith were made in 1879 by myself with a 5¼-inch silver-on-glass reflecting telescope, by Calver. Speaking generally, the land and sea outlines appear to be permanent, though slight alterations are noticed from time to time. The late Richard A. Proctor, Mr. N. E. Green, M. G. V. Schiaparelli and others have charted the markings, and names have been assigned to them.

Those used in this chapter for the different regions shown on the accompanying illustrations are taken from the chart of Mr. Green, which most accurately shows the details. The sketches include all parts of the planet. The dark markings shown are:—1, Dawes Forked Bay, which at best is seen double, reminding one of a serpent's tongue; 2, Burton Bay; 3, Herschel II. Strait; 4, Arago Strait; 5, De La Rue Ocean; 6, Newton Sea; 7, Lambert Sea; 8, Knobel Sea; 9, Tycho Sea; 10, Christie Bay; 11, Terby Sea; 12, Airy Sea; 13, Campani Sea; 14, Miraldi Sea; 15, Pratt Bay; 16, Trouvelot Bay; 17, Maunder Sea; 18, Huggins Bay; 19, Hooke Sea; 20, Oudeman Sea; 21, Delambre Sea; 22, Kaiser Sea; 23, Main Sea; 24, Zollner Sea; *w*, Schmidt Bay; 26 Flammarion Sea.

The brighter portions, indicated by letters, are:—*a*, South Polar Cap; *b*, North Polar Cap; *c*, Phillips Island; *d*, Jacob Land; *e*, Beer Continent; *f*, Mädle Continent; *g*, Rosse Land; *h*, Secchi Continent; *i*, Webb Land; *k*, Le'grange Peninsula; *l*, Gill Land; *m*, * Noble Cape; *n*, Burckardt Land; *o*, Fontana Land; *p*, Herschel I. Continent; *q*, Cassini Land; *r*, Dreyer Island; *s*, Lockyer Land; *t*, Hirst Island; *u*, Kunowski Land; v^{s}, Proctor Cape; 46, Banks Cape.

The bright "island" in fig. 2, marked Y, is not on Mr. Green's chart, but is named Pyrrhae Regis by M. Schiaparelli. The land around the south of Terby Sea (fig. 3) is Kepler Land, and that to the north Copernicus Land, and the lake to the north of Terby Sea is named by M. Schiaparelli Tithopius Lacus. Hind Peninsula is the narrow tongue running in between Flammarion Sea and Main Sea, as shown on fig. 7.

M. Eugene Antoniadi has found that a comparison of all the drawings of Hind Peninsula and Main Sea indicates a distinct modification of outline during the present century. There will be noticed very brilliant borders to some of the seas, as in figs. 4, 5 and 8, which seems to imply snow-capped mountain chains near the coast, as in the case of our own great mountain system, the Andes, which extend along the western coast-line of South America.

The rotation period of the planet Mars, according to the calculation of the late Mr. Richard Proctor, amounts to 24h. 37m. 22·735s., which it is obvious is only a little longer than that of the earth; therefore the same spots come to the same positions a little later each evening.

(*To be continued with other illustrations.*)

ALBINISM IN FLOWERS.—Mr. A. E. Burr at page 203 *ante* asks if any reason has been, or can be, assigned for albinism? It is well known that the pigments of flowers are all formed on the spot wherein they occur. Hence, if it happens that a flower normally red, blue or yellow is found now and again white, the presumption is that the chromogen of the particular tint has not been formed, or it has been prevented by external or internal circumstances from developing in the ordinary way. Where the flower is usually coloured, then albinism is a symptom of a sickly state, that is, there is a deficiency of the chromogen. Where, on the other hand, the flower is normally white, then the pallor is caused in most cases, I believe, by habitat; for example, the flowers of meadow-sweet ought really to be red, and I know of no reason why they should not be so, other than that they never become sufficiently dry. The reason why albinism occurs so frequently in flowers with red or blue in their colour and not in yellow, is that the red and blue are the result of liquids contained in the cells, while most of the yellow are due to insoluble granules closely united with a protoplasmic stroma. Hence the latter colour is more directly dependent on the vitality of the floral organ, more likely to be usually produced, and less liable to fade or be dissolved away. Thus it follows that albino red or blue petals may be all alive, though sickly by ill-nourishment. On the other hand, albino yellow petals must be considered as wholly or partially defunct. With regard to the phenomenon of double flowers, it is no doubt caused by what may be termed a partial demise of the special living activity of the reproductive organs. In some cases it may be due to over-feeding; but in most instances it seems to be brought about by a deficiency of nutriment acting on a vital part predisposed to degradation.—(*Dr.*) *P. Q. Keegan, Patterdale, Westmorland.*

BUTCHER'S BROOM.—Is not the information given in the Floras concerning *Ruscus aculeatus* defective and possibly erroneous? The time of flowering is given in the "Student's Flora" as February-April, and in Babington's "Manual" as the iii. iv. months. I am inclined to think the flowering time extends over a much greater period than the spring. During the present year I have found it in bloom from March to November. I am told it can usually be found in flower in Epping Forest during November. I saw it there, and also near West Wickham, in flower last month. Another matter on which further information seems desirable is to what extent is fruit produced? It is my experience that the production of berries is rare. Twice during the past year I came across the butcher's broom fruiting. The first occasion was near Arundel, during May, in a locality where the plant is exceedingly abundant. Here, after careful search, only two green berries, about the size of peas, were found. At the same time both male and female flowers were plentiful. Near West Wickham, where last month the butcher's broom was flowering and fruiting, one clump bore seven berries, and two others five berries each. Growing amid the dead bracken on a sloping hillside, under the spread of old oak trees, the evergreen butcher's broom, with its large scarlet berries, stood out very effectively among the prevailing brown of its surroundings. The size of the berry is given in the "Student's Flora" as one-third inch diameter, but it appears to reach a greater size than this. One that I brought away from West Wickham being five-eighths of an inch in its longest diameter. In appearance and shape the berries are very much like cherries.—*C. E. Britton, 35, Dugdale Street, Camberwell; 13th December, 1898.*

IRISH FUNGI.—In the "Irish Naturalist" for December, there is an important list of 160 additions to Mr. Greenwood Pim's "Fungi of the Counties of Dublin and Wicklow." It is compiled by Mr. Carleton Rea, Hon. Sec. British Mycological Society. It arises out of the visit of that society last summer to Dublin.

LATE FLOWERING PLANTS.—In the grounds attached to the Leicester Lunatic Asylum over a hundred species of hardy plants were still in bloom on November 16th, and specimens of the fresh flowers were exhibited by Dr. Finch at the meeting of the Biological Section of the Literary and Philosophical Society. The unusually mild and sunny season should have thoroughly ripened the new wood of all fruit trees, so that a prolific yield of fruit may be anticipated next year, or rather of fruit blossom; for while the bloom depends largely on the ripening of the wood, the fruit is very much at the mercy of spring frosts, biting winds, and insect ravages.—*F. T. Mott, Leicester.*

FUNGI AND THE LATE DROUGHT.—The effect of drought on the growth of the larger fungi has been very evident during the past autumn. The early autumnal drought succeeding a waterless summer seemed in this neighbourhood to have quite a lethargic effect upon fungoid growth. October was really gone before we noticed signs of the many Agaricini, Boleti and other fungi associated with particular spots in this neighbourhood. One of the most brilliant and dangerous, *Agaricus muscarius*, has been scarce when compared with other years, whilst such species as *A. pantherinus*. *A. rachodes*, and *A. procerus* have been entirely absent. Another missing plant has been *Boletus edulis*; this on one particular place has grown for the previous nine years without fail. Other Polyporei, as *Daedalea*, *Polyporus* and *Trametes*, do not show any falling off from the drought; as these are epiphytal in their growth, this is of course only natural. Amongst other terrestrial fungi that have suffered, *Hydnum*, *Clavaria* and *Cantharellus* may be mentioned, *Clavaria* especially has been most conspicuous by its absence. It would be interesting to note if the same effect has been noticed in other localities. We are on the London clay here, and one would suppose it sufficiently retentive to prevent the mycelium being affected to such a degree as to hinder the formation of the spore-bearing part of the fungus. Probably the cause is due to the great drain on the soil by tree roots, so that little or no moisture could be obtained by the mycelium. This I am inclined to think is partly the reason, since meadow fungi, such as the smaller *Coprini*, some of the genus *Hygrophorus* and meadow-loving Agaricini, have been up to the average.—*John W. Odell, Grove Farm, Stanmore, Middlesex.*

CONTRIBUTED BY FLORA WINSTONE.

SCIENCE (New York, November 18th) contains some interesting notes on "Yeast Fermentation." One by Catherine E. Golden and Carleton G. Ferris deals with fermentation without the action of live yeast-cells, being an analysis of the statement made by E. Buchner in 1897, in which he claimed to have induced active fermentation of various sugars with a sterile extract obtained from dried yeast by filtration. Miss Golden further writes on the deterrent action of salt in yeast fermentation. She states she has found by experiments that sodium chloride in any but minute quantities retards fermentation. "A Bacteriological Study of Pear Blight," by L. Synder, describes a non-parasitic organism that was found with *Bacillus amylovorus* on trees which were blighted. The organism is white, and its colonies closely resemble pear blight. It is also morphologically similar to the latter. Unlike pear blight it ferments potato broth, pear broth and cane sugar solution, with a copious evolution of gas.

COMPTES RENDUS (Paris, November 21st). M. M. J. Janssen communicates the results of his observations, taken from a balloon, of the Leonids on the night of November 13th to 14th. The departure took place from the gas-works at Villette at 2 a m, He was accompanied by MM. Dumuntet and Hansky. The balloon was kept at an elevation of from 150 m. to 200 m., and the view of the sky obtained was admirable. M. Hansky devoted his attention especially to the constellation of Leo. The other observers dealt with the rest of the sky. From 2.45 a.m. to 4.30 a.m., M. Hansky registered over fourteen stars, of which thirteen were radiant; the others saw from ten to twelve Leonids and as many more sporadic meteorites. M. Janssen strongly impresses upon astronomers and observatories the advisability of turning their attention to this method of obtaining observations when weather is unfavourable for investigations from the earth. M. Charles Andrée also has a note on the Leonids, as seen from the observatory at Lyons on November 14th: these are referred to in our astronomical column. M. Th. Schlœsing writes on the utilization by plants of phosphoric acid dissolved in the water in the soil. It is usually thought, he says, that the phosphoric acid contained in the soil is so small a quantity as to be of little or no use in the growth of vegetation. He was himself of the same opinion until lately, when he came to the conclusion after careful investigation, that in spite of its scarcity, it ought to be taken into serious consideration as a source of phosphorus in plants. This scarcity M. Schœsing points out is really only in appearance, as the phosphoric acid is continually renewed from the various solutions in the soil, as the roots of the plants suck it up. He gives a tabular series of the results obtained by him in some experiments on the amount of phosphoric acid in the soil and in the plants during consecutive days and under varying conditions.—The number of November 28th contains a note, by M. L. Matruchot, upon the coloration of protoplasm by the pigments of fungi. He gives an account of some experiments made by himself, proving, in his opinion, that certain fungi have pigments which, when thrown off from the cells, are capable of fixing themselves upon the protoplasms of other living organisms, and of partially altering their structure. This process of coloration has produced the same results as the use of bacterian pigments. MM. E. C. Teodoresco and Henri Coupin unite in a short account of the influence of anæsthetics upon the formation of chlorophyll. They commenced their experiments upon plants that had been reared in more or less darkness, and were somewhat weakened in consequence. They placed them under bell-glasses, tightly fitting, and of a good size. The first bell-glasses were charged with a liquid anæsthetic, which quickly evaporated. Having been left for a day, the plants were compared with those that had been put under a glass in the sunlight without an anæsthetic, and it was found that the formation of chlorophyll in the former was greatly impeded. There are a few more notes on the Green Ray (SCIENCE-GOSSIP, *ante* p. 189) by M. Piot-Bey, in which he confirms M. de Maubege's account of this phenomenon seen in Egypt at the rising of the sun, and adds that when the ray is seen at sunset it is not uncommon for it to become ultimately of a blue colour.—December 5th. M. Berthelot contributes a very interesting note on the synthesis of phenol with acetylene. The combination, though interesting chemically, does not appear likely to be of much commercial value. M. Henri Moissan writes on the action of acetylene on the ammonium metals. In reactions of alkaline metals with carburetted hydrogen, decomposition is often very violent, the temperature also is high; but the ease with which ammonium metals combine at a low temperature makes it possible to obtain a new method of reaction slower and more manageable. M. Moissan details various experiments made by himself, of the action of acetylene on ammonium metals — calcium-ammonium, potass ammonium, and sodammonium. The resulting combinations of acetylenics and carburets are soluble in ammonia, and this property renders it possible to obtain at a low temperature new reactions, for instance, with metallic chlorides and iodides. It is recommended that in all experiments with acetylene only that made from calcium carbide should be used.

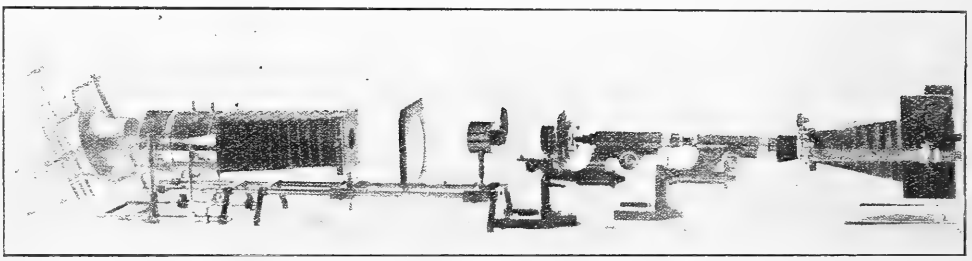
NATUR UND HAUS (Berlin, vol. vii. No. 5). This illustrated magazine, suitable for all lovers of nature, has greatly improved since it was last noticed in these columns. Herr D. F. Werner contributes an article on "The Praying Mantis" (*Mantis religiosa*), accompanied by six figures of the male and female, and some varieties drawn by the author from nature. There is also a note, with illustration, of *Galago galago* Schreb., now in the Zoological Gardens at Berlin. Vol. vii. No. 6 contains an article by Herr C. Langheinz on the *Turnix nigricollis* Gml., from Madagascar. A plate is given showing the male and female of these birds. Dr. Ernest Küster contributes an article on "The Algae of the Adriatic," accompanied by three illustrations of *Padina pavonia*, *Amphiroa* and *Halimeda*. There are among the illustrations some reproductions of fine photographs of palms, including *Sabal palmetto*, *Corpha umbraculifera* and *Caryota urens*, all from Ceylon. They are good examples of the rich tropical flora of that island. There are many other articles and notes of interest.

MICROSCOPY

CONDUCTED BY J. H. COOKE, F.L.S., F.G.S.

To whom Notes, Articles and material relating to Microscopy, and intended for SCIENCE-GOSSIP, *are, in the first instance, to be sent, addressed "J. H. Cooke, Edlestone, Battenhall Road, Worcester."*

A NEW PHOTO-MICROGRAPHY.—Seven years ago Dr. Lenal described in a leading scientific journal, published in Germany (Zeitschr. f. Wiss. Mikr.), an instrument consisting of a microscope with a second microscope attached to it in place of an eye-piece, by means of which he claims to be able to obtain a much greater magnification of the primal image than had hitherto been secured by any combination of eye-pieces and objectives. Dr. Dallinger, E. M. Nelson, and other eminent British microscopists reviewed Lenal's method, and pointed out, at the time, that it was fallacious to suppose that the working-power of any objective could be increased by subjecting the primal image of an approximately perfect object-glass to examination by a second microscope or other complex combination of lenses. Greater magnifications may be obtained, but such enlargements will simply be those of the details of the microscopic image which has been brought about by diffraction in the first objective, and therefore there cannot by any possibility be a single detail added; while the details that the accurate image does disclose must be blurred and tortured tenfold more than when subjected to the legitimate action of well-constructed eye-pieces. Notwithstanding, however, the scathing criticisms with which Lenal's methods were received, other workers continued experimenting in the same direction, and Professor Elmer Gates now describes in the pages of the current issue of the "American Microscopical Journal" a perfected form of Lenal's apparatus. By placing two microscopes end to end, the first fitted with a one-sixth objective, and the second with a half-inch objective and a one-inch ocular, Gates claims that he can get much better definition and detail than can possibly be obtained under any conditions by the use of either a one-sixteenth or a one twenty-fifth objective. By means of his apparatus he has made photo-micrographs of Pleurosigma magnified 450 diameters, 1,450 diameters, 6,000 diameters, and 10,000 diameters. By focussing a sixth on a sixth objective he obtained a photograph of a portion of the same object enlarged 360,000 diameters. This he considers to be the limit at present obtainable with an ordinary camera in a dark room, and with the usual photographic technique; but, given suitable conditions, he expects, by using a twelfth objective in the first microscope, and a sixth in the second, to obtain a magnification of 1,200,000 diameters, which will be equal to an area of 1,440,000,000,000 times the area of the original object. This may sound incredible, but he states that he has already obtained evidence of being able to photograph a magnification of over three million diameters, or over twelve trillion times the area of the object. Expensive objectives are quite unnecessary for this purpose, as low-power lenses are all sufficient to do the very best work. Some idea of the arrangement of Professor Gates's apparatus may be obtained from the accompanying figure. At the extreme left is an arc lamp, next to which are the condensing lenses, then the alum filter with its bellows, and after, the lenses used to render the rays parallel. The revolving diaphragm is placed at the right-hand end of the parallelizing lenses. Between the bellows of the filter-cell and the parallelizing lenses there is a screen holder, in which is placed coloured gelatine films to screen out such rays as may not be desirable. Beyond the revolving diaphragm the light next enters the sub-stage Abbe condenser, and thence through the object to the two microscopes and the camera. The arc lamp used is of about 2,000 candle-power.



GATES' DOUBLE MICROSCOPE WITH ARC-LAMP, CONDENSING AND PARALLELIZING LENSES, ALUM FILTER AND CAMERA.

THE MALARIA MICROBE.—The recent researches of Surgeon Ross, of the Army Medical Corps, have proved that malaria can be acquired from a mosquito bite, and that the malaria microbe is one which, as a rule, prefers insects as a medium for its propagation rather than man. Particular species of malaria parasites even demand particular species of mosquitoes, a fact that partly explains the apparent vagaries in the distribution of varieties of malaria. When all is known Europeans may be able to live in climates now made deadly by this pest.

"ILLUSTRATED ANNUAL OF MICROSCOPY."—One of the principal desiderata of microscopists for years past has been an "annual" in which details of the progress made in the various departments of research might be recorded, and the newest devices in apparatus and methods illustrated and described.

That want has now been supplied by the "Illustrated Annual of Microscopy," an excellent publication issued by Messrs. Lund and Co., Amen Corner, E.C., at the price of 2s. 6d. Its table of contents is varied and extensive, among other articles being several on photo-micrography, bacteriological investigations, the technique of mounting, pond life, and the theory of micro-optics. Among the contributors appear the names of such well-known workers as Van Heurck, Cole, Hartog, Beck, Karop, Soar and Spitta, each of whom treats of the subject that he specialises. It is an extremely valuable work, well edited, well printed on excellent paper, and profusely illustrated with exquisite photo-micrographs and engravings.

British Freshwater Mites.—Notwithstanding the great attention that has been given by microscopical workers to pond life, a very small amount of systematic work has been done among the British freshwater mites. The labours of Dr. C. F. George and Mr. C. D. Soar in this direction are well known to all students of the Hydrachnidae, but, excepting their publications and a few isolated papers by other workers, contained in miscellaneous journals and periodicals, there is little literature on the subject that is accessible to the average British student. The works of Walckenaer, Müller, Koch and Kramer are classic, but they contain such a heterogeneous mass of data, that we still await the services of a bibliographer who has the time and ability to collate and arrange the numerous details respecting the genera and species that are scattered through them. For British workers this branch of microscopical study offers itself as a fruitful field for investigation. Not so much in the discovery of new varieties and species, as the determination of what it is that serves as the host of the parasitical young of these organisms, and in the elucidation of the many other obscure points in connection with their life-histories.

Spots in Cheese.—Professor Connell has been giving his attention to the investigation of the spots and rings that so frequently appear in cheeses, and which are popularly known as cheese "rust." The result of his labours has been to demonstrate that the disease is due to an organism that varies in size from $\frac{1}{25000}$ to $\frac{1}{15000}$ of an inch in length. He has isolated and mounted it. It stains well with ordinary aniline dyes in recent cultures, but it stains best with carbol-fuchsin or aniline water, gentian or violet.

A Microbe-proof Laboratory.—An eminent German bacteriologist has recently erected at Yokohama a microbe-proof laboratory built of glass blocks. There are no window-sashes, and the doors when closed are air-tight. The air supply is forced into the room through a pipe, and filtered through cotton-wool to cleanse it of bacteria. To ensure further sterilization the air is driven against a glycerine-coated plate-glass, which captures the microbes that the wool spares. The few microbes brought into the house in the clothes of the workers soon die in the intense sunlight with which the house is flooded.

Loan of Mounted Specimens.—Mr. C. Baker, 244, High Holborn, London, proposes starting a department for lending mounted specimens, much on the same lines as a lending library. To microscopists in general, but to those far removed from microscopical clubs and societies especially, this innovation will be a boon. Full particulars of the scheme can be obtained on application to the above address.

Daylight Aurora.—Did any of our readers see anything of a daylight display of aurora on the morning of 10th September last? From the cliffs between Herne Bay and the Reculvers, at about 10 to 10.30 a.m., our esteemed editor, Mr. Carrington, saw what seemed to be an elongated, glowing, slightly-curved belt, or arc, over the magnetic pole, which varied in intensity. The sky was quite clear of clouds, with brilliant sunshine. The phenomenon was visible for about half-an-hour. Further observations would be useful. Daylight aurora was said to have been seen from Tuam, on January 2nd, 1756.—*F. C. Dennett*, 60, *Lenthall Road, London, N.E.*

Fossils from Millstone Grit.—Bands of fossils in the Millstone Grit not being common, I mention a section in a quarry which I first visited about ten years ago, on the side of Pule Hill, a well-known eminence a short distance from Marsden, near Huddersfield. Here, abundant casts of fossil shells are found. The beds have a slight easterly dip, and are a considerable distance above the Yoredale shales, and below the Coal Measures. The summit of Pule Hill is capped by the Rough Rock, the highest bed of the Millstone Grit. The quarry is chiefly worked for flagstones. The fossiliferous bed is but a narrow one, about one foot thick, and lies just above the flagstones. It is of a yellowish colour, and very fine-grained. The fossils are numerous, though they occur almost without exception as casts. The most abundant is *Bellerophon*, which is found in hundreds. There are also several Gasteropods and Lamellibranchs, especially the genus *Myalina*.—*J. H. Grundy, Lynwood, Smallshaw, Ashton-under-Lyne.*

Royal Institution.—Among the lecture arrangements at the Royal Institution before Easter are the following, on scientific subjects:—Sir Robert Ball, six lectures (adapted to young people) on Astronomy; Professor E. Ray Lankester, ten lectures on "The Morphology of the Mollusca"; Mr. A. Henry Savage Landor, three lectures on "Tibet and the Tibetans"; Dr. Allan Macfadyen, four lectures on "Toxins and Anti-toxins"; the Right Hon. Lord Rayleigh, seven lectures on "The Mechanical Properties of Bodies." The Friday evening meetings will begin on January 20th, when a discourse will be delivered by Professor Dewar on "Liquid Hydrogen"; succeeding discourses will probably be given by the Right Hon. Sir Mountstuart E. Grant Duff, Mr. Victor Horsley, Professor H. S. Hele-Shaw, Mr. Richard R. Holmes, Sir Frederick Pollock, Bart., Professor H. L. Callendar, the Right Hon. Lord Rayleigh, and other gentlemen. The year 1899 is the Centenary Year of the Royal Institution, and arrangements are being made with a view to its celebration in a fitting manner. Details will be announced at a later period. There seems to be an impression among some people that the work carried on at the Royal Institution is largely physical; but, as will be seen by the above list of lectures, this is by no means the case.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY. — October 27th, 1898, Mr. J. W. Tutt, F.E.S., President, in the chair. Mr. Ashdown exhibited twenty British species of Longicorn Coleoptera which he had brought to add to the Society's collection. Mr. Montgomery, a specimen of the third brood of *Cyaniris argiolus* bred on September 30th; specimens of three broods of *Selenia bilunaria*, of which the third brood followed the second; and specimens of a third brood of *Coremia ferrugata* (bred). Mr. Mansbridge, two blue varieties of the female, and two underside varieties, of *Polyommatus bellargus*, and remarked that the females of this species seemed to get more blue year by year. Mr. Dennis, pupa and cocoon of both *Chaerocampa elpenor* and *Sphinx ligustri*. Mr. Tutt, on behalf of Mr. Gordon, a considerable number of species taken in Wigtonshire, including *Saturnia pavonia*, with much red on the hind-wing; a pale fawn *Smerinthus populi*; *Phalera bucephala*, with right fore-wing dark; *Caenonympha typhon*, chiefly var. *rothliebii*; strongly banded *Pelurga comitata*, and others. Mr. Adkin, variable series of *Bryophila perla*, *B. muralis* and *Botys flavalis*, to illustrate his paper entitled "Lazy Days by the Sea." A discussion ensued.—November 10th, Mr. J. W. Tutt, F.E.S., President, in the chair. The evening was devoted to a special exhibition of varieties and was a most successful gathering. Mr. Robinson, on behalf of Mr. A. H. Jones, of Eltham, specimens of the following species and varieties: *Lycaena corydon*, a light-brown female; *Melanargia galatea*, an unusually perfect white band; *Argynnis paphia* var. *valezina*, with basal spots confluent; *Xanthia aurago*, nearly unicolorous; *Ephyra pendularia*, with red suffusion; *Thais cerisyi*, a melanic female from Armenia, and *Argynnis pales* var. *arsilache*, from the Engadine. Mr. Robinson also exhibited gynandromorphous specimens of *Cleora lichenaria* and *Crocallis elinguaria* from the New Forest. Mr. Chittenden, *Xanthia aurago*, red, yellow, pink and dark forms; *Anchocelis lunosa*, a red form and a black form; black forms of *Agrotis corticea* and *A. segetum*; *A. exclamationis*, red form; and a pair of beautifully marked *Toeniocampa incerta*. Mr. Williams, a long bred series of *Pararge egeria*, very brilliant in colour, and also a fine bred series of *Amphydasis betularia*, derived from ova of an ordinary female and showing a wonderful development of melanism, which in some specimens almost reaching var. *doubledayaria*. Mr. Mansbridge, *Cabera pusaria* var. *rotundaria*, bred from North Kent. Mr. Edwards, *Abraxas grossulariata*, in which the white arcas were closely dusted with fine black dots and having the orange markings very intense. Mr. Rose, a fine series of *Xanthia aurago*, rich uniform red, bright canary-coloured and banded forms of all shades, from Reading. Mr. Butler, of Reading, *Stauropus fagi*, ordinary dark, pale and intermediate forms, together with specimens of a second brood; also exceptionally dark forms from an August pairing; a very dwarf captured *Luperina testacea*; *Xanthia aurago*, a series showing all the named forms, together with an undescribed pink form, and a greasy-looking form of *Vanessa io*. Mr. Tutt, specimens of a *Zygaena* received from M. Oberthur, of Rennes, named by him *Z. palustris*, and apparently identical with the large form of *Z. trifolii*=*Z. trifolii-major*, also a marsh frequenting form; two cabinet drawers of British Argynnids and Brenthids for comparison with Dr. Chapman's exhibit of the same species, and a long series of *Brenthis pales* from various continental localities. Mr. Pearce, a considerable series of *Bryophila perla* from Folkestone, among which were a good proportion of leaden forms. Mr. South, a bred series of thirty-five *Spilosoma lubricepeda* var. *zatima*, and seven males of the type from the same batch of *zatima* eggs; *Eubolia limitata*, light golden-brown forms and very dark specimens; *Boarmia cinctaria*, a light form, bred from Irish ova; and *Hydraecia micacea*, bred from potato stems. Dr. Chapman, very long series of *Aglais urticae* and several species of European Argynnids, and read notes on their modifications in the various localities he had visited in Europe. Mr. Lucas, series of *Libellula quadrimaculata* and of *Calopteryx virgo* from his own and Rev. J. E. Tarbat's collection, showing great variation; the var. *praenubila* of the former species, and three smoky males of the latter, from Surrey, were very noticeable. Mr. Nevinson, *Cleora glabraria*, very dark; *Fidonia clathrata*, almost unicolorous; *Acidalia contiguaria*, light and dark forms; *Fidonia atomaria*, male, with female coloration; *Carpocapsa pomonella*, unicolorous pale form, reared from a walnut. Mr. Adkin, local forms of *Aplecta occulta*, some magnificent dark specimens; *Dianthaecia nana* (*conspersa*), from all the chief British and Irish localities, and his drawers of Argynnids and Brenthids. Mr. Moore, some grand underside forms of the leaf-butterfly, *Kallima inachis*, and a series of *Salamis antera*. Mr. West, of Streatham, *Vanessa atalanta*, without spots in the red marginal band of the hind-wings, and *Catocala nupta*, with unpigmented streaks on the hind-wings.—*Hy. J. Turner, Hon. Report. Sec.*

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—Annual meeting, December 6th, 1898—Exhibits: Mr. J. A. Clark, a collection comprised in several large glass-topped boxes, giving the life-history of *Cossus ligniperda*. He had bred many insects right through from the egg, and showed preserved larvae in many stages, one being of a "putty colour," which he said illustrated the change which came over this larva during hibernation. Sections of tree-stems and wood revealed the burrows gnawed by the larvae, one gallery being five or six inches long, showing the insect did not pupate close to the bark. Mr. Bate had experience in breeding this moth artificially, he had found his larvae did not penetrate far into the wood supplied, but pupated close to the bark. In March his larvae, having hibernated, were of the usual red colour. Mr. Tutt asked whether some go through the winter as pallid and some dark red? Or, whether they change their skin in spring? It appears they will feed between emerging from hibernation and pupation, and Mr. Clark presumed the dark colour came back with feeding. In all his searching for this insect Mr. Clark had never happened to meet with one pupating under ground. Mr. Mera spoke of finding a cocoon made of earth, sticking out of a hedge-bank some distance from a tree. He pointed out the larvae do not hibernate in the same sort of cocoon as that used to pupate. He attributed the pallid colour to the

starvation during hibernation. Mr. A. Bacot showed a box of *Spilosoma lubricipeda* bred in 1895 from ova received from Mr. Hewitt. The parents were shown, the female having a tendency to aberration *zatima*. There were fifty specimens, twenty being males and thirty females. As to the central spot on fore-wings, in seven males and nine females, *i.e.* thirty-two per cent. of the offspring, this is stronger or better marked than in either parent, while in three males and six females, or eighteen per cent., it is notably weaker. As to the costal blotch on the fore-wings, on the left fore-wing of one male only is this more prominent than with the male parent, but ten males and three females, or twenty-six per cent., have it as well marked or stronger than the female parent. As to the transverse bands on the fore-wings, seven males and nine females, or thirty-two per cent., have the transverse bands as strong and distinct as the male parent, and in many cases less broken up into spots, so that, as a transverse band, it is better marked than in either parent. As regards the width of the band due to the longitudinal length of the separate spots, none of the offspring can vie with the female parent. The tendency to approach aberration *zatima* is in no instance so strong in the brood as with the female parent, and the under-wing blotches are also less developed. Mr. F. B. Jennings, a larva from a willow stump at Edmonton, being that of the Cardinal beetle, *Pyrochroa*, probably sp. *serraticornis*, as that is the only one of the genus known to occur in the district. Rev. C. R. N. Burrows, a number of common species of autumn insects, but of interesting forms, from Mucking, Essex, including *Cerastis spadicea* (*ligula*) type form and vars.; *Miselia oxyacanthae*, with a yellow-grey form, and ninety-nine specimens of *Epunda lutulenta*, in none of which was there a tendency to the Irish form. Also *Sphinx convolvuli*, from Cranbrook, Kent. Mr. A. W. Mera, a series of bred male and female *Camptogramma fluviata* from South Devon, which emerged last September, and a number of beautiful bred specimens of *Spilosoma lubricipeda* developed by selection from wild stock taken on Lincolnshire coast, ranging in variation from type to aberration *radiata*. Mr. S. J. Bell, insects from Sandown, I. W., *Vanessa urticae*, one specimen with right side-wings of a tawny ground colour instead of the usual red, presumably caused by damage to pupa, which was moved about just at the time of pupation; two red specimens of *Leucania lithargyria;* two *Sesia ichneumoniformis* taken by sweeping over *Lotus corniculatus* in afternoon, and four *Trochilium crabroniformis* (*bembeciformis*) taken on poplar trunks. Mr. Riches, a series of *Eucosmia undulata* bred from Colchester larvae. Mr. Woolley, a magnificent exhibit of several boxes of Lepidoptera recently taken in America. Business followed, and the President then gave his annual address, reviewing the history of this old society from its inauguration in 1858, under the style of the Haggerston Entomological Society. It successfully opposed attempts made to destroy and enclose parts of Epping Forest, and obtained suitable room for the Doubleday Collection at Bethnal Green Museum and its thorough preservation. He spoke of the new species of insects recorded during the year now closing and noted the occurrence of such of the rarer species as have come before the entomological world. He then entered upon a discussion of the various problems that had faced him during an exhaustive study of the Anthrocerids.—*H. A. Sauzé, Hon. Sec.*

METROPOLITAN SCIENTIFIC SOCIETIES.

The following is a list of societies in the London district devoted to natural science, with hours and places of meeting. They may be visited with introduction from a Fellow, Member, or Secretary. Will secretaries send additions or corrections.

ANTHROPOLOGICAL INSTITUTE OF GREAT BRITAIN, 3, Hanover Square. Second and fourth Tuesdays at 8.30 p.m., November to June.

BATTERSEA FIELD CLUB AND LITERARY AND SCIENTIFIC SOCIETY. Public Library, Lavender Hill, S.W. Thursdays, 8 p.m.

CITY OF LONDON COLLEGE SCIENCE SOCIETY, White Street, Moorfields, E.C. Last Wednesday in each month, October to May, 7.30 p.m.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY, London Institution, Finsbury Circus. First and third Tuesdays, 7.30 p.m.

CLAPHAM JUNCTION NATURAL SCIENCE CIRCLE, Young Men's Christian Association Rooms, Battersea Rise, S.W. Alternate Wednesdays, 8 p.m.

CONCHOLOGICAL SOCIETY, LONDON BRANCH, St. Peter's Rectory, Walworth. Irregular meetings. Rev. J. W. Horsley, President, will answer enquiries.

CROYDON MICROSCOPICAL AND NATURAL HISTORY CLUB, Public Hall. Third Tuesdays, October to May, 8 p.m.

DULWICH SCIENTIFIC AND LITERARY ASSOCIATION. Fortnightly lectures Lordship Lane Hall, second and fourth Mondays, 8.15 p.m., from October, for winter season.

EALING NATURAL SCIENCE AND MICROSCOPICAL SOCIETY. Victoria Hall, Ealing. Second and last Saturdays. October to May, 8 p.m.

ENTOMOLOGICAL SOCIETY, 11, Chandos Street, Cavendish Square. First Wednesday, October to June (except January). Third Wednesday, January, February, March and November, 8 p.m.

GEOLOGISTS' ASSOCIATION, University College, Gower Street. First Friday, 8 p.m., November to July.

GEOLOGICAL SOCIETY OF LONDON, Burlington House, Piccadilly. First and third Wednesdays, 8 p.m., November to June.

GREENHITHE NATURALISTS' AND ARCHÆOLOGICAL SOCIETY, 7, The Terrace. First Fridays, 7 p.m.

LAMBETH FIELD CLUB AND SCIENTIFIC SOCIETY, St. Mary, Newington, Schools, Newington Butts, S.E. First Mondays all the year and third Mondays in winter, 8 p.m.

LINNEAN SOCIETY OF LONDON, Burlington House, Piccadilly. First and third Thursdays at 8 p.m., November to June.

LONDON AMATEUR SCIENTIFIC SOCIETY, Memorial Hall, Farringdon Street, E.C. Fourth Friday in each month, October to May, 7.30 p.m.

LUBBOCK FIELD CLUB. Working Men's College, Great Ormond Street, Bloomsbury, W.C. Excursions second Sundays, Meetings following Mondays, 8 pm.

MALACOLOGICAL SOCIETY OF LONDON, meets in Linnean Society's Rooms, Burlington House. Second Friday each month, November to June, 8 p.m.

MINERALOGICAL SOCIETY. Meets in rooms of Geological Society, February 4th, April 14th, June 23rd, November 17th, 8 p.m.

NONPAREIL ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY, 99, Mansfield Street, Kingsland Road, N.E. First and third Thursdays, 8 p.m.

NORTH KENT NATURAL HISTORY AND SCIENTIFIC SOCIETY. St. John's Schools, Wellington Street, Woolwich. Alternate Wednesdays, 7.30 p m.

NORTH LONDON NATURAL HISTORY SOCIETY, Sigdon Road Boys' Board School, Dalston Lane, Hackney Downs Station. First and third Thursdays, 7.45 p.m.

QUEKETT MICROSCOPICAL CLUB, 20, Hanover Square. First and third Fridays, 8 p.m.

ROYAL BOTANIC SOCIETY OF LONDON, Regent's Park. Second and fourth Saturdays at 3.45 p.m.

ROYAL HORTICULTURAL SOCIETY, 117, Victoria Street, S.W. Second and fourth Tuesdays, except December to February; 2 p.m. on show days, which vary.

ROYAL METEOROLOGICAL SOCIETY, 22, Great George Street, Westminster. 3rd Wednesday, November to June, 8 p.m.

ROYAL MICROSCOPICAL SOCIETY, 20, Hanover Square. Third Wednesdays, October to June, 8 p.m.

SELBORNE SOCIETY, 20, Hanover Square. Meetings and rambles are arranged by the various local branches.

SIDCUP LITERARY AND SCIENTIFIC SOCIETY, Public Hall. Sidcup. First and third Tuesdays, October to May, 8 p.m.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY, Hibernia Chambers, London Bridge, S.E. Second and fourth Thursdays, 8 p.m.

SUTTON SCIENTIFIC AND LITERARY SOCIETY, Public Hall Chambers. Second and forth Tuesdays, 8 p.m.

WEST KENT NATURAL HISTORY, MICROSCOPICAL AND PHOTOGRAPHIC SOCIETY. Meets in School for Sons of Missionaries, Blackheath, third Wednesday, in December, fourth Wednesdays in October, November, January, February, March, April, May, 8 p.m.

ZOOLOGICAL SOCIETY OF LONDON, 3, Hanover Square. First and third Tuesdays, 8.30 p.m., November to August.

NOTICES OF SOCIETIES.

*Ordinary meetings are marked †, excursions *; names of persons following excursions are of Conductors.*

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

Jan. 3.—†Discussion: "Coast Insects. Why are Insects of certain species confined to our Coasts in England, which on the Continent occur inland?" Dr. T. A. Chapman.
,, 17.—†Consideration of formation of a "Publication Fund." *Hon. Sec., H. A. Sauzé.*

CLAPHAM JUNCTION Y.M.C.A. NATURAL SCIENCE CIRCLE.

Jan. 11.—†"The Microscope" and Microscopic Demonstration. Arthur Newton.
,, 28.—†"The Light of Olden Days." E. Lovett.
Feb. 8.—†Geological Lecture. Prof. J. Logan Lobley, F.G.S.
,, 22.—†"Interesting Features of Plant Life." Lime-light views. W. H. Griffin.
Mar. 8.—†Lecture on "Chemistry," with experiments. W. G. Whiffen, F.I.C., F.S.C.I.
,, 22.—†"South Africa." Lime-light views. Duncan Milligan, F.R.A.S.
April 5.—†"The position of Insects in regard to Man and their influences on Plants." A. Bacot.

Hon. Sec., F. W. Cannon, 1, Glycena Road, S.W.

GEOLOGISTS' ASSOCIATION OF LONDON.

Jan. 6.—†"The Glaciers and Fjords of the Bergen District, Norway." Horace W. Monckton, F.L.S., F.G.S. Lantern views.

Hon. Sec., Percy Emary, F.G.S., Alwyne Square, Canonbury, N

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

Jan. 12.—†"Orthoptera." Stanley Edwards.
,, 26.—†Annual Meeting. Chair taken at 7 o'clock.

SELBORNE SOCIETY—CROYDON AND NORWOOD BRANCH.

Jan. 15.—†"About Frogs and Toads." H. S. M. Grover. Telegraph Messengers' Institute, Upper Norwood, 8.15 p.m.
Mar. 23.—†"Birds and Bird Protection." E. A. Martin, F.G.S. Croydon Liberal Association Rooms, 8.30 p.m.
April —†Annual Meeting, 8 p.m. Lecture, 8.30 p.m.: Fred W. Ashley, F.Z.S.

STREATHAM GEOLOGICAL AND NATURAL HISTORY SOCIETY.

Jan. 7.—†"Some British Birds." G. White.
,, 21.—†"Geology of Caterham Valley." L. W. J. Costello.
Feb. 4.—†"The Inhabitants of a Pond." H. K. Hunter.
,, 18.—†"On the Excursion to Herne Bay." J. P. Johnson.
Mar. 4.—†Short Papers on Summer Excursions.

Hon. Sec., L. W. J. Costello, Callington, Stanhope Road, Streatham, S.W.

HULL SCIENTIFIC AND FIELD NATURALISTS' CLUB.

Jan. 11.—†"Alpine Plants in a Highland Glen." Lantern slides. Rev. A. E. Shaw, M.A.
,, 25.—†"The Structure of Fishes." H. M. Foster.
Feb. 8.—†"Wireless Telegraphy," with Experiments. T. W. Ireland, M.A.
,, 22.—†"The Mosses of the East Riding." Lantern views. J. J. Marshall.
Mar. 8.—†"Shooting Stars." J. A. Ridgway.
,, 22.—†"Electrical Measurements," with Experiments. J. T. Riley, D.Sc., A.R.C.Sc.I.

The Meetings are held at 72, Prospect Street, Hull, at 8 p.m.

T. Sheppard, Hon. Sec.

TUNBRIDGE WELLS NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

Jan. 12.—†"The Lances of Heaven." Lantern. Sir Robert Ball, F.R.S., LL.D. 3 p.m.
,, 20.—†"Timepieces—Created and Made." Mr. Herrmann.
Feb. 3.—†"The Fallaciousness of the Senses." Miss Cooke.
,, 17.—†Specimen and Microscopical Meeting. "Some Movements of Plants"; R. R. Hutchinson.
Mar. 8.—†"Wonders and Romance of Insect Life." Lantern. F. Enoch, F.L.S., F.E.S., F.R.H.S. 3 p.m.
,, 24.—†"The Chaldean Genesis." H. S. Roberton, B.A., B.Sc.
April 7.—†"British Vegetable Gall Formations." E. T. Connold.
,, 21.—†Specimen and Microscopical Meeting. "Insects' Metamorphoses," H. de C. Child.

Hon. Assist. Sec., R. R. Hutchinson, Belmont, Princes Street.

PRESTON SCIENTIFIC SOCIETY.

Jan. 11.—†"Geological History of Ribble Valley and Estuary." E. Dickson, F.G.S.
Jan. 25.—†"Carnivorous Plants." H. E. Willis, M.A.
,, 2, 7, 9, 12, 13, 16, 18, 19, 23, 24, 26, 27, 30.—†Sectional Meetings and Instruction Address in Microscopic Mountings, Geology, Botany, Astronomy, Photography and Natural History.

Lecture Hall, 119, Fishergate.

W. H. Heathcote, F.L.S., Sec.

IMPORTANT NOTICE.

THE Proprietor of SCIENCE-GOSSIP having decided to manage the business department from an independent office at 110, Strand, London, W.C., all subscriptions, advertisements and payment for advertisements must in future be sent to that address, and no longer to the Nassau Press. We desire to refer our readers for full explanation to advertisement page iii., accompanying this number.

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TO CORRESPONDENTS AND EXCHANGERS.—SCIENCE-GOSSIP is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer. Notices of changes of address admitted free.

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NOTICE.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* should be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names. Scientific names and names of places to be written in round hand.

THE Editor will be pleased to answer questions and name specimens through the Correspondence column of the magazine. Specimens, in good condition, of not more than three species to be sent at one time, *carriage paid*. Duplicates only to be sent, which will not be returned. The specimens must have identifying numbers attached, together with locality, date and particulars of capture.

THE Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

CHANGE OF ADDRESS.

C. E. Britten, to 35, *Dugdale Street, Camberwell.*

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NOTICE.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

OFFERED, British botanical specimens, mostly rare. Wanted, botanical microscopical slides. Lists exchanged. "London Catalogue," 9th edition, used for herbarium specimens.—Miss E. Armitage, Dadnor, Ross.

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WANTED, Coleoptera (British and foreign), also store boxes, in exchange for South African Coleoptera, Lepidoptera, etc., plants, shells, or micro material.—Delancey Dods, Box 634, Cape Town, South Africa.

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